PRODUCTIVITY COMMISSION

AUSTRALIAN NATIONAL UNIVERSITY

# Microeconomic reform and productivity growth

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**Inquiries**

Paul Gretton
Productivity Commission
PO Box 80
Belconnen ACT 2616

Telephone: (61) 2 6240 3252
Email: pgretton@pc.gov.au

Professor Steve Dowrick
Department of Economics
The Faculties
Australian National University
Canberra ACT 0200
Telephone: (61) 2 6249 4606
E-mail: steve.dowrick@anu.edu.au



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# Foreword

In February 1998, the Australian National University and the Industry Commission (now incorporated into the Productivity Commission) jointly held a workshop on microeconomic reform and productivity growth. We were delighted that this cooperative venture was successful in drawing together a group of participants with evident theoretical and policy-advising expertise.

The particular focus of the workshop was on the nexus between microeconomic reform and productivity performance. This is an important issue given the role of productivity growth in raising living standards and the current public debate about the role of microeconomic reform. The workshop provided much food for thought — making it clear that there are no easy or ready-made answers to establishing this nexus.

To capture the diversity of views and perspectives represented at the workshop, this volume brings together the papers presented, discussants' comments on those papers and summaries of discussion to each session. It is intended that the exchange of views at the workshop and their publication in this volume will stimulate and guide development of research into this important field.

We are grateful to everyone who participated in the workshop, particularly those who prepared the papers contained in this volume. We are also grateful to those involved in organising the workshop and editing the proceedings. The organising group comprised Jeff Borland and Satish Chand as well as Steve Dowrick from the Australian National University and Paul Gretton, Ian Monday and Lynne Williams from the Productivity Commission. The editorial committee comprised Paul Gretton, Steve Dowrick and Lynne Williams, with support from Damien Eldridge, Greg McGuire and David Cobau.

In addition, we are grateful for financial support provided to the workshop by the Department of Industry, Science and Tourism and the Australian Bureau of Statistics.

Gary Banks
Chairman
Productivity Commission

Professor Steve Dowrick
Head, Department of Economics
Australian National University

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## Abbreviations

| | |
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| ABS | Australian Bureau of Statistics |
| ACA | Australian Communication Authority |
| ACCC | Australian Competition and Consumer Commission |
| ACCI | Australian Chamber of Commerce and Industry |
| ACOSS | Australian Council of Social Service |
| ACTU | Australian Council of Trade Unions |
| AHEIA | Australian Higher Education Industry Association |
| AIRC | Australian Industrial Relations Commission |
| AMPS | advanced mobile ’phone system |
| AMWU | Australian Manufacturing Workers Union |
| ANU | Australian National University |
| ANZSIC | Australian and New Zealand Standard Industrial Classification |
| AOTC | Australian and Overseas Telecommunications Corporation |
| APO | Australian Post Office |
| APS | Australian Public Service |
| ASIC | Australian Standard Industrial Classification |
| AT & T | American Telephone and Telegraph Company |
| ATM | asynchronous transfer mode |
| AUSSAT | (the Australian domestic communications satellite system) |
| AUSTEL | Australian Telecommunications Authority |
| AWA | Australian workplace agreements |
| AWIRS | Australian workplace industrial relations survey |
| AWU | Australian Workers Union |
| BCA | Business Council of Australia |
| BEA | Bureau of Economic Analysis |
| BIE | Bureau of Industry Economics |
| BLS | Bureau of Labour Statistics |
| BTCE | Bureau of Transport and Communications Economics |

| | |
|---|---|
| C&A | Conciliation and Arbitration |
| CAM | cost allocation manual |
| CAN | customer access network |
| CD | compact disk |
| CES | Commonwealth Employment Service *(or)* |
| CES | constant elasticity of substitution |
| CET | constant elasticity of transformation |
| CGE | computable general equilibrium (model) |
| CEO | chief executive officer |
| COA | chart of accounts |
| COAG | Council of Australian Governments |
| CPE | customer premises equipment |
| CPI | consumer price index |
| CPS | current population survey |
| CRTS | constant returns to scale |
| CSO | community service obligations |
| DAIC | directly attributable incremental cost |
| DEA | data envelopment analysis |
| DEETYA | Department of Employment, Education, Training and Youth Affairs |
| DEYA | Department of Employment and Youth Affairs |
| DIR | Department of Industrial Relations |
| DWS | displaced worker survey |
| ECA | Employment Contracts Act |
| ECM | error correction model |
| EEZ | exclusive economic zone |
| EMTR | effective marginal tax rate |
| EPAC | Economic Planning Advisory Commission |
| EPE | employment placement enterprise |

| | |
|---|---|
| ERP | effective rates of protection |
| FBT | Food, beverages and tobacco |
| FDI | foreign direct investment |
| FTE | full time equivalent |
| GDP | gross domestic product |
| GFCE | gross fixed capital expenditure |
| GNE | gross national expenditure |
| GNP | gross national product |
| GP | gross product |
| GST | goods and services tax |
| GTE | government trading enterprises |
| HES | household expenditure survey |
| IAC | Industry Assistance Commission |
| IC | Industry Commission |
| IDD | international direct dialling |
| IEDB | International Economic Data Bank |
| IIT | intra-industry trade |
| LAP | labour adjustment packages |
| LFS | labour force survey |
| LIMDEP | (econometrics package) |
| MC | marginal cost |
| MFP | multifactor productivity |
| NAIRU | non-accelerating inflation rate of unemployment |
| NRA | nominal rate of assistance |
| NSW | New South Wales |
| NZ | New Zealand |
| NZIER | New Zealand Institute of Economic Research |
| NZM | New Zealand Murphy (model) |
| OECD | Organisation for Economic Co-operation and Development |

| | |
|---|---|
| OLS | ordinary least squares |
| OTC | Overseas Telecommunications Commission |
| PC | Productivity Commission |
| PIM | perpetual inventory method |
| PMV | passengers motor vehicle |
| QEC | Queensland Electricity Commission |
| R&D | research and development |
| RBA | Reserve Bank of Australia |
| RIM | remote integrated multiplexor |
| ROSA | Review of Ownership and Structural Arrangements |
| RSS | remote switching stage |
| RULC | real unit labour cost |
| SA | South Australia |
| SCRCSSP | Steering Committee for the Review of Commonwealth/State Service Provision |
| SDA | service delivery agency |
| SEQEB | South East Queensland Electricity Board |
| SP | service provider |
| SPF | stochastic production frontier |
| STD | subscriber trunk dialling |
| STM | Symonds Travers Morgan |
| SUR | seemingly unrelated regression |
| SVA | shareholder value added |
| TCF | Textiles, clothing, footwear and leather goods |
| TCR | termination, change and redundancy |
| TFP | total factor productivity |
| TINA | telecommunications information networking architecture |
| TSLRIC | total service long run incremental cost |
| UK | United Kingdom |

| | |
|---|---|
| US | United States of America |
| VA | value added |
| VANS | value-added network services |
| VCOSS | Victorian Council of Social Service |
| WA | Western Australia |
| *WRA 1996* | *Workplace Relations Act 1996* |

## Definition of productivity measures

In productivity analysis, the terms 'multifactor productivity' and 'total factor productivity' are commonly used, some times interchangeably. In this volume, multifactor productivity (MFP) refers to the productivity of the main primary factors of production — labour and capital — in generating value added. It differs from total factor productivity (TFP) — a measure which recognises intermediate transactions in materials and services, along with capital and labour as production inputs, and uses gross output as a measure of output.

In addition, many partial productivity measures are used in productivity analysis. One of the most common of these is 'labour productivity' which refers to output per unit of labour input (generally number of persons or hours worked). Output may be measured as either value added or gross output. Labour productivity series cited in this volume generally use value added as the measure of output.

# PART A: INTRODUCTION

# 1 INTRODUCTION

*Gary Banks*

Interest in the topic of productivity growth is widespread — and not only among economists. There has been increasing recognition by governments, business and in the wider community that sustainable increases in Australia's living standards depend largely on the productivity performance of our economy.

One aspect of this is that higher national productivity translates into higher real household incomes. In a recent report, the Industry Commission estimated that, over the past three decades, increased productivity was responsible for around two-thirds of the 80 per cent rise in per capita incomes in Australia (IC 1997). Among the important benefits of higher productivity is our capacity as a society to provide effective healthcare, education and welfare support for the community.

That said, there is a need to understand better the *sources* of productivity growth. We know that the development and application of technological and other knowledge, the better organisation of production within firms and more efficient allocation of resources between industries, can all improve productivity performance. However, there are many issues that remain unresolved concerning the interplay of such sources of growth, including their relative importance and the underlying processes that lead to change. The workshop focused on the links between productivity performance and microeconomic reform. The dialogue it stimulated on this important policy issue will hopefully continue and be built upon.

Microeconomic reform is essentially about reducing institutional, regulatory and other policy-related impediments to a more efficient and productive economy. For example, the international integration of the Australian economy has been facilitated by reduced barriers to the flow of foreign goods, services and capital and has allowed resources to shift to more productive activities. These changes as well as other pro-competitive reforms also stimulate firms to search for the best means of achieving productivity improvements, including through technological change and other innovations. They also help ensure that the benefits from productivity gains flow through to the economy in the form of lower prices.

Nevertheless, there is still much debate and uncertainty over the extent to which such reforms can raise the *rate* of productivity growth, as distinct from bringing once-off improvements in productivity *levels*. There is also clearly a need to develop our understanding of the links between reform and productivity growth and for more empirical testing of the significance of those links.

Both the Australian National University (ANU) and the Commission have had a longstanding interest in these matters. Illustrative of a long tradition of influence at the ANU, there is Wilfred Salter's analysis of technical change and it effects on prices, costs and productivity; Max Corden's contributions to trade theory and assistance policy; Trevor Swan's work on growth models and, more recently, Steve Dowrick's cross-country comparisons of growth, as well as the wide ranging contributions to economic policy analysis by Bob Gregory and Fred Gruen.

As for the Commission, in one way or another all aspects of its work have been concerned with improving living standards through structural reform and greater productivity. At the heart of this are the policy guidelines in the Commission's statutory charter. These require it to have regard to the Government's objectives 'to improve the overall economic performance of the economy through higher productivity in the public and private sectors in order to achieve higher living standards for all members of the Australian community'.

A distinguishing and challenging analytical task faced by the Commission is the requirement to take an economy-wide view in providing advice to governments. This has called for the development and use of analytical tools, including economic modelling, which can gauge the flow-on effects of particular interventions across industries and regions.

Thus, in examining the links between microeconomic reform and productivity growth, there is interest in enhanced understanding of:

- the micro foundations of productivity at the firm level; and
- how changes at the firm level flow through to national aggregates.

A pre-requisite for such analysis is a good information base. There is much to be done to improve the quality and coverage of Australian productivity estimates. Reviews currently under way in the Australian Bureau of Statistics, and the Commission's own work, are expected to provide improved information on productivity and sources of productivity growth in Australia.

The Government said that in establishing the Productivity Commission, it wants the new organisation to play an even larger role in helping policy-makers understand the links between microeconomic reform, productivity and economic growth. And it wants to elevate the level of appreciation of these issues in the wider community.

Work already requested by the Government, including traditional inquiries, will make an important contribution to understanding the factors inhibiting productivity growth in various areas of the Australia economy. For example, the Productivity Commission has reported on the international competitiveness of the black coal industry (PC 1998a), work arrangements in stevedoring (PC 1998b) and road service provision (PC 1998c), with studies of meat processing, and building and construction to follow. These studies will provide information on the benefits and costs of workplace arrangements, both formal and informal, involving workers and management. Work formerly undertaken by the BIE in benchmarking the performance of Australia's economic infrastructure against world best practice is continuing. A study of the waterfront has been released (Productivity Commission 1998d), with a report on telecommunications to follow.

Over the last year, we have undertaken and published some new research into Australia's productivity performance, and more is in train. One recent research paper provides a broad assessment of Australia's productivity performance and another contains a more detailed investigation of productivity growth in Australian manufacturing industry (Industry Commission 1997 and Gretton and Fisher 1997).

This work suggests that there has been a substantial upturn in productivity growth in the 1990s (Figure 1.1). National productivity indicators are also showing stronger and more sustained growth than could be expected on the basis of past recoveries from recession.

Many reasons could be advanced both for the low levels of productivity growth in the 1980s and for the marked increase in the 1990s. In our view, sustained microeconomic reform over the last two decades has made a contribution to this improvement — but it is only part of a larger story. To establish a better understanding of the processes of growth and how microeconomic reforms influence these, there is a need both to disentangle the reasons for the productivity slowdown in the 1980s and its acceleration through the 1990s.

At the sectoral level, benchmarking studies suggest room for further productivity improvements. Taking into account both economy-wide and sectoral trends, there is a need to assess what Australia's productivity potential might actually be over the longer run, and the influence of microeconomic reform on that.

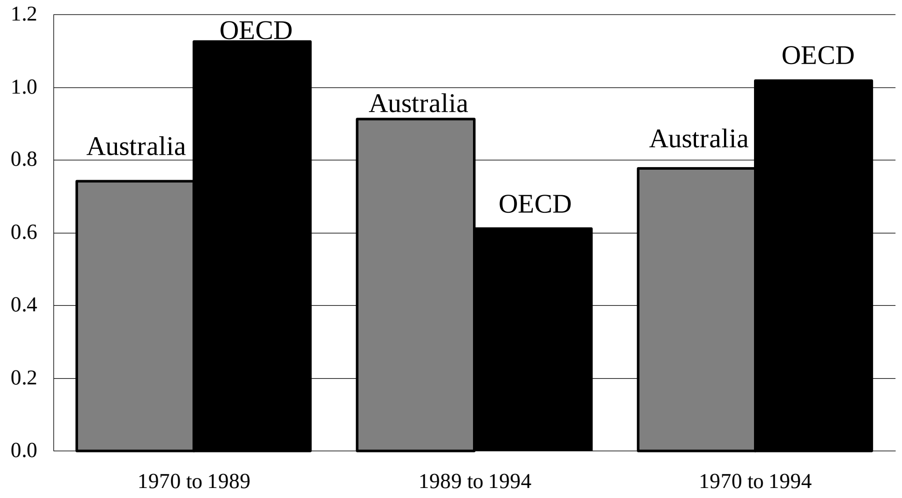
Figure 1.1. **Annual growth in trend multifactor productivity,**[a] **1964–65 to 1995–96** (per cent)


a Percentage change from previous year.
*Source:* Derived from ABS data.

At the international level, OECD data indicate that Australia's productivity growth over the two and a half decades to 1994 was about 20 per cent below the average for the OECD countries (Figure 1.2). In fact, Australia had one of the slowest rates of growth in the OECD area, being ahead of only two other countries — Canada and the United States. In the five years to 1994, reflecting an increase in Australia's rate of productivity growth and a decline in the OECD average, we moved towards the OECD average.

To get a better understanding of the international growth process in the context of microeconomic reform, we need to be able to assess the determinants of differing growth performance among countries, and identify factors within the control of individual governments that enable countries to realise their productivity potential. In particular, an important question for analysts and policy makers in Australia is whether the recent experience in this country is a transitory phenomenon or whether it represents a permanent improvement relative to the OECD average.

Figure 1.2 **Average annual multifactor productivity growth for Australia and the OECD,[a] 1970 to 1994** (per cent)




a OECD MFP includes Agriculture, hunting, forestry and fishing, Mining and quarrying, Manufacturing, Electricity, gas and water, Construction, Wholesale and retail trade, restaurants and hotels, Transport, storage and communication, Financial services, insurance, real estate and business services and Community, social and personal services.

*Source:* Commission estimates based on OECD data.

Further research by the Commission on the drivers of productivity growth is under way or planned in a number of areas, including:

- indicators for assessing the effects of microeconomic reform on productivity growth;
- the effects of microeconomic reform on industry structure and structural change;
- productivity growth in the wholesale and retail trade industries; and
- a decomposition of sectoral growth over the last decade.

A case study of the effects of microeconomic reform on the aluminium industry has recently been released (Industry Commission 1998).

To provide the best quality advice to government, it is important that researchers and policy advisers keep abreast of developments in the analysis and measurement of productivity and related issues. This need is reinforced by the call from policy makers for a more systematic and integrated picture of these issues.

In providing advice to governments on how best to improve productivity and Australia's growth prospects, advisers and researchers also need to understand

and address community concerns about the adjustment consequences of policy reforms. People are understandably worried about job security and many have first hand experience of the pain of unemployment. In many minds, the push for higher productivity and growth is associated with dislocation and job losses. The fact that the adjustment pressures are often concentrated in particular activities or regions raises the political ante. The result can be a defensive response from government, which addresses short term and sectional objectives at national cost.

Productivity growth does not have to mean fewer jobs. The available evidence does not reveal any necessary relationship — whether at the economy-wide, industry, or even firm level. Over the broad sweep of time, productivity growth and employment growth have coincided throughout the world. Indeed, for the OECD as a whole, the rising rates of unemployment in recent decades have coincided with falling productivity growth rates.

The evidence suggests that employment outcomes are likely to be influenced more by general demand conditions, labour market regulation and other factors. Labour market reform may affect employment and productivity growth. For example, policies that favour the employment of more lower skilled and lower paid workers could simultaneously lower both unemployment and average productivity in the short run. On the other hand, policies favouring technological change and organisational improvements could raise the productivity of all workers over time. To elicit the full effects of change, reform policies affecting the labour market and its regulation should be reviewed and considered in the same depth as any other proposals for change.

Avoiding microeconomic reforms and thereby retarding productivity improvements runs the risk of *creating* rather than reducing unemployment by, for example, damaging the competitiveness of some firms and suppressing the skill development of employees. It seems clear that attempts to retain jobs in uncompetitive sections of Australian industry have not been a success. Even very high import tariffs did not prevent employment levels falling in Australia’s automotive and textile, clothing and footwear sectors, although they may have slowed the decline. These sectors have also had the slowest growth in output and the largest employment losses in manufacturing since 1968–69.

Nevertheless, it is also clear that microeconomic reform remains under challenge in the community generally and, in some respects, even within the economics profession itself. It has been argued that likely productivity and growth improvements engendered by microeconomic reform have been overstated and that greater attention to other policy fronts would have a higher pay-off. Some question whether the longer-term gains are sufficient to outweigh the short-term adjustment costs, which are typically born upfront and carry more weight in net present value calculations.

All this provides a challenge to ensure that we have the analytical tools and expertise to account properly for the various benefits and costs of microeconomic reforms. We also need the tools to design programs that provide net improvements in productivity and growth that simultaneously maximise the flow-on benefits to the community and minimise the costs of adjustment.

Against this background, there are some important questions on which this workshop volume and ensuing research need to shed greater light. These include:

- How well can productivity be measured?
- How can microeconomic reform improve productivity and growth? What are the static and dynamic effects? How does microeconomic reform affect growth through mechanisms other than those evidenced by productivity?
- How important is microeconomic reform relative to the other drivers of productivity improvement?
- What microeconomic policies provide the greatest leverage and should they be prioritised?
- How should we assess the costs of improving productivity and how can adjustment issues best be handled?

The workshop was convened and structured with such questions in mind. This structure has been carried forward to this volume. The papers presented in Part B focus on measurement issues and concepts. Part C examines the recent growth performance of Australia and New Zealand within the context of past trends and developments within the OECD. Part D then reports case studies of productivity and microeconomic reform in Australian industry and provides an opportunity to consider a broad range of labour market and adjustment issues. In Part E, Bob Gregory provides a summing up.

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# PART B: CONCEPTS AND MEASUREMENT ISSUES

# 2 CONSTRUCTION AND USE OF MEASURES TO GUIDE MICROECONOMIC REFORM

*Catherine J. Morrison*

## 2.1 Introduction

The overall issue I am addressing in this paper is how productivity, or more generally economic performance, is measured and how it relates to microeconomic reform. This is a very broad question with associated broad implications. In this discussion, I will narrow this focus somewhat to the conceptual basis for productivity growth measurement, and the use of such measures to evaluate efficiency, growth, the existence of economic distortions, and other issues of policy relevance.

The initial question to address when attempting to discuss a concept like productivity growth is 'what does it mean'? Construction and use of measures representing a notion such as 'productivity' must be based on careful consideration of the conceptual basis for the definition and representation of economic performance, and how productive performance, or productivity, fits into the formula.

Many buzzwords are used when talking of productivity and performance, such as 'competitiveness', 'market power', 'distortions', and other words that must be precisely defined in order to be interpretable and applicable. Since the issues are so broad and the implications so important, it can be very dangerous to rely on these buzzwords for guidance without carefully thinking about their underlying rationales. It may also be very misleading to apply pat formulas or rules without thinking in depth about what they mean. Again, careful consideration of what the underlying conceptual and theoretical basis might be, and the *goals* of productivity measurement, evaluation, and enhancement through policy, is necessary to provide a foundation for discussion.

In this paper, I will be touching on various issues related to the definition, measurement, interpretation, and use of economic performance and productivity growth measures. Assessment of the existing state of economic performance for a firm, industry or country is a fundamental initial goal to guide policy to enhance this performance. Further measurement of the results of policy choices, via measures of productivity changes and their determinants, are important to evaluate the success of policy. Both these efforts require a clear view of their conceptual foundation before surging ahead.

Many complicating issues arise when posing questions about how to carry out the construction and use of economic performance measures in this context. Keeping these complexities in mind is, however, necessary for appropriate interpretation and use of these measures. I will be dealing with many such issues in the rest of this background paper, which may not always be easy to deal with, but must at least be recognised.

## 2.2 What do ‘productivity’ and ‘economic performance’ mean?

I have taught classes on the use of production theory models to evaluate economic and productive performance. I typically begin such a course with the question in the title of this section. The answers I initially generate invariably emphasise that how these concepts might be defined depends on who’s *perspective* we are talking about.

For example, one of the first answers I always get has to do with profitability, or the dollar value of a firm. This clearly suggests something ‘good’ for the associated entrepreneur or manager. However, *why* the product or firm is ‘valuable’ in this sense is an important issue. It could, for example, arise from over-pricing a commodity due to market power in the output market for this product. Similarly, paying workers low wages due to market power in the labour market could cause high profits. In these cases, profitability is good for the firm, but bad for consumers or workers, and does not indicate the ‘greater good’ for all that one might think is a more valid definition of productivity.

Similarly, from the perspective of workers, the terms ‘productive’ or ‘good performance’ may involve high wages, future potential and working conditions. From the point of view of the consumer, it might have to do with quality and price or ‘value’ of a product. However, again, these are just pieces of the more macro or overall question of productivity, which should have a more general welfare connotation. Welfare enhancement for the greater good must involve increasing the size of the ‘pot’ or ‘pie’ that is divided up among the different actors in an economy. This requires getting more from what we have, or increasing per capita national income.

Greater productivity in this sense, ultimately has all the individual impacts mentioned above for firms, workers, and consumers. However, it may also involve distributional changes — not all economic agents may become better off. For example, in my first scenario, if high profitability results from excessive market power, reform to increase efficiency and productivity will likely reduce that profitability. Determining *how* to increase efficiency in this situation, however, involves a much more complete and detailed analysis than just identifying whether a firm has a large share of the market. It requires careful evaluation of the underlying efficiency of production, and the potential existence of excessive profitability.

More specifically, in any given situation, assessment of current economic and productive performance requires evaluation of the underlying productive structure, and whether increasing technical efficiency might be generated by better use of the technology, or greater allocative efficiency could result from changing input or output composition. This in turn involves consideration of existing restrictions on adjustment.

If these restrictions are technical, such as short-run fixities, it may be that the firm is on the most efficient path, but simply has not yet reached the 'best practice' point. If they are market-oriented, it may be that market structure is generating inefficiencies from lack of competition or through market power. If they have to do with regulatory distortions, it may be that deregulation is necessary to allow economic forces to work effectively. Ultimately, once these technical, market and regulatory inefficiencies are eliminated, further enhancement of growth requires technical and structural change.

Thus, overall economic and productive performance involves stimulating (technical and allocative) efficiency, market competitiveness and ultimately technical change to generate further growth. The question we are dealing with here, however, is how to conceptualise, define, measure, and encourage strong productive performance and efficient adjustment of firms, industries and the nation toward this greater productivity.

To evaluate these pieces of the puzzle the underlying question has to do with the *goal* of performance measurement. What is 'good' productivity or performance and how do we represent it appropriately? What behaviour might be welfare-enhancing, and what might *restrict* welfare? To address these issues we must think about the encompassing 'productivity picture' and then look more carefully at the individual pieces of the puzzle.

## 2.3 An overview of the 'productivity puzzle' and its components

Ultimately, productivity growth involves getting more from what we have. Getting a bigger 'pot' of goods for everyone as a whole means generating greater output from a particular amount of resources or inputs, or increased output *net* of inputs. That is, to identify increased productivity rather than just an increase in size, output growth that can be 'explained' by input increases must be accommodated.

The first issue to address for conceptualising, computing and interpreting such a measure is how to define and measure these outputs and inputs. Real or physical quantity measures are desired for such an exercise, since it is the true amount of goods, rather than their nominal value, that determines welfare.

Two underlying issues to deal with when attempting to distinguish real-quantity measures are quality changes and the existence of appropriate prices. That is, increases in welfare could arise from increasing either the quantity or quality of goods. However, if goods are assumed homogeneous, the quality differential, and thus this potential aspect of productivity, is buried and thus unmeasurable. Quality changes in the environment as well as measured products may also be important, where environment, means living conditions and working environment as well as the natural environment. These aspects of quality are particularly difficult to measure.

True economic prices are also important to determine, since typical productivity measures assume optimality in markets so marginal costs are approximated by prices of outputs, and shadow values (or value marginal products) by prices of inputs (see Box 2.1). If this approximation is not valid, measures of the level and change in productive performance may be misleading.

In addition, relevant prices are important for distinguishing quantity from price changes, and for adding (weighting) different components of the input and output vectors. For the latter, given the wide range of products and inputs we attempt to summarise by simple measures like 'output' and 'labour input', we must add 'apples and oranges' somehow, and the typical weight is the price. Price distortions will thus cause biases in individual measured quantities and additional problems for aggregate measures.[1]

[1] Such distortions (or deviations of true economic marginal values from market prices) have been discussed, for example, in the context of computer prices by Cole *et al.* (1986), Triplett (1987) and Gordon (1990), among others. The connection with capital more generally, in terms of embodied technical change and obsolescence, is discussed in many studies including Baily and Gordon (1988), Hulten (1993), Berndt and Morrison (1995) and Morrison (1997a)

### Box 2.1: **Shadow values**

Differences between market prices and true economic values of inputs and outputs may occur for a number of reasons, including lack of competitive markets, regulations that preclude market processes functioning properly, fixities that limit short-run adjustment, and market power that causes a 'wedge' between the private and social valuations. These deviations are difficult to measure using observed data by definition, since markets do not reflect appropriate economic or shadow valuations in these cases.

The direction and possibly some idea of magnitude of such price biases may in some cases be determined by careful consideration of the constraints in a market and the extent to which they are likely to be binding. Cost-benefit analysis is often designed to identify these marginal valuations when markets are not working. More rigorously, however, econometric techniques to identify shadow values may be used. In this case, the reason for the distortion must be incorporated in the function used for analysis of the production structure (such as the cost, or possibly production or profit function).

Quantifying constraints such as regulatory restrictions, in order to include them as arguments of the function, may also be difficult to accomplish. In many cases, however, either dummy variables representing the initiation of such regulation, or proxies for the results of such regulation may be used (eg the amount of pollution abatement capital in response to pollution abatement regulation, as in Morrison 1988). In other cases, including levels instead of prices in the cost or profit function facilitates measuring the true marginal value of the input or output rather than assuming a condition like Shephard's lemma holds (see Morrison1998a).

For example, including the level of an input in a variable cost function $G(p, x,Y,t)$ (where $p$ is a vector of prices of the variable inputs $v$, $x$ is a vector of input levels not consistent with the usual Shephard's lemma result that optimal input demand may be characterised by $\partial G/\partial p_j=v_j$, $Y$ is output and $t$ is a time counter representing the state of technology) allows the shadow value to be measured as $\partial G/\partial x_k=-Z_k$ (Morrison 1985, 1998b and the references above). Estimating such shadow values must be approached with care. As emphasised by the discussant for this paper, Tim Coelli, estimation of complex econometric models presents its own complications for specification and interpretation.

The primary question, therefore, is *how* to measure 'effective' or true quantities and prices of outputs and inputs. To measure quality changes, one might try to include information on effective levels into the data directly, for example by adjusting labour input for education levels or hours worked.[2] Another method could be to separately identify the quality characteristic as one of the inputs into the production process (eg education as a human capital, or 'knowledge capital' factor). A full hedonic analysis might even be carried out and built into the analysis of the output or input to represent its characteristics and accordingly to

2 As in Jorgenson, Gollop and Fraumeni(1987).

augment the estimation of measures representing performance changes with this quality information.[3]

For prices, if market values do not represent true economic values, this may be addressed also in the construction of the data, in the model representing performance, or at least in the interpretation of results from the analysis. That is, the real or effective economic value in the context of efficiency or productivity measurement involves the marginal costs of outputs (resources used up in production of the marginal unit), and shadow values or marginal products of inputs (marginal benefits in terms of allocation of costs across inputs, or expansion of production). However, price distortions may occur that cause these marginal valuations to differ from their observed market prices.

These differentials could be due to various market, technological and regulatory impacts, such as monopoly/monopsony market power, regulations that cause output production or input use to deviate from their cost minimising levels, or fixities that cause utilisation fluctuations and keep short-run costs from their best levels. All these market characteristics suggest markets are not 'working' appropriately, but adaptation for them depends on evaluating the *reason(s)* for the deviation.

For example, if rigidities or fixities exist for a particular input, the true marginal short-run value of the input is its shadow value. For current evaluation of economic conditions, this price should be used, since firms are appropriately optimising given the short-run constraints. The gap between this shadow value and the market price represents short-run utilisation fluctuations, which in turn generates important information about the sources of measured inefficiency and its changes.

Deviations of short- from long-run costs should thus ideally be captured in measures to identify 'inefficiencies' arising from this aspect of production, which reflects rational optimising behaviour, separately from inefficiencies due to, for example, misuse of the existing technology. However, this is not straightforward.

Similar arguments hold for price distortions resulting from market power or regulations, but again the trick is to identify these deviations from 'full efficiency' explicitly, so their impact may be identified and potentially measured. This involves thinking carefully about the underlying conceptual economic structure, and what the appropriate marginal cost or shadow value would include to represent optimality.

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3 Triplett (1987) emphasised the usefulness of this approach for measurement of computer quality, usually focusing on the measurement of prices.

This is not simple even conceptually, much less mechanically, since it involves representation of the technological, regulatory and market structure, and careful consideration of how these interact to determine what 'should' be happening in the market. It therefore ultimately requires a detailed specification of the cost structure, from which the marginal costs of outputs or marginal shadow value of inputs may be imputed (Box 2.2).

Before elaborating further on the conceptual and theoretical basis for measuring true productive performance in the presence of complicating market and technological factors, and highlighting some potential pitfalls, it is useful to explore what types of issues regarding output and input effectiveness might affect particular input and output measures.

For example, output composition (especially when talking of a national aggregate) might change dramatically over time. Additional external outputs (eg 'bad' outputs such as pollution and 'good' outputs that have positive spillovers) may also be relevant, particularly when evaluating the impacts of reform to 'fix' markets that do not exist. In terms of prices, monopoly or oligopoly market power and regulatory incentive schemes such as those affecting exports versus domestic production, may have important consequences.

For labour, hours, education, demographics, and outsourcing may have impacts on the quantity side, and labour protection regulation or unions may affect prices (or possibly both prices and quantities, depending on the form of the regulation or union power). For capital, obsolescence, short-run utilisation, and the 'power' as compared to the 'number' of machines may have impacts on effective quantity measures. The price and potentially the quantity of capital may be affected by incentive schemes (such as for R&D, safety, energy savings and import market penetration). In addition, service inputs are important inputs whose price and quantity crucially depend on various quality and composition issues. Its level of processing, and import restrictions, will also affect measures of materials input.

## Box 2.2: **Environmental factors and biases**

Box 2.1 focused on shadow values, which represent the overall cost impact (or marginal valuation in terms of input costs) of a change in an output or input level, or of a variable representing constraints from, say, regulation.[4] Two extensions to this notion are important to add: the possibility of other external factors that may have an associated shadow value; and the potential for differential output or input responses. The later extension may result in changes in output/input composition from biases with respect to any of these arguments of the cost function.

The first extension involves more carefully considering the notion of 'environmental' variables (sometimes thought of as 'control' variables) that represent the operating environment of the firm or industry. These variables may reflect constraints on the availability of, say, capital, or regulatory constraints affecting production, as raised earlier (the imposition of price supports could, for example, be included as a dummy variable in a regression model). In the context of technical change and enhancement of growth, knowledge factors such as R&D, educational levels (human capital), or the extent of high-technology capital in the capital stock may provide information about external factors affecting potential production (Morrison and Siegel 1997). External knowledge factors may generate marginal benefits, and thus positive shadow values. Environmental inputs into the production process should at least be recognised in the interpretation of any economic performance measures. Econometric estimates of their impacts may provide additional insights about their role in augmenting or restricting performance.

All these potential arguments of the cost function may also have input-specific impacts. These impacts are represented as second-order effects. That is, if the shadow value of a factor $x_k$ is measured as $\partial G/\partial x_k = -Z_k$, as indicated above, the bias from changes in $x_k$ may instead be represented in terms of a second-order derivative $\partial^2 G/\partial p_j \partial x_k = -B_{jk}$. Since $\partial G/\partial p_j = v_j$ from Shephard's lemma, this gives us the input $v_j$ — the specific impact of changes in $x_k$. If this differs from the overall cost effect, input-saving or input-using biases are evident. An analogous idea underlies the notion of technological biases, as discussed in Jorgenson (1988), where the second derivative is in terms of $t$ instead of $x_k$. In fact, such a measure may be generated for any argument included in the function as an input or output level, or environmental variable, allowing biases to be measured with respect to, say, pollution abatement regulation (Morrison1988).

[4] If another function is used as a basis for representation of the production or technological structure, such as a production or profit function, the impact on production or profits instead of costs would be the foundation for analysis.

This list of issues that should be taken into account in constructing input and output series just scratches the surface of the difficulties that emerge when applying simple economic principles to measuring the complex real world. Box 2.2 examines some extensions to the basic model to deal with real-world complexities. Again, it is very important to *think* carefully, using the 'thinking structure' provided by our economic models, augmented by our knowledge of the technological, behavioural and other characteristics of a particular industry, to guide our construction of data and measures for representation of economic performance.

## 2.4 The productivity-growth residual and its interpretation

Once we have constructed data that seem justifiable for analysis, possibly even more important (or at least more often ignored) issues arise about how to put these data together, and ultimately to interpret and use the resulting measures.

Determining productivity growth involves the evaluation of output growth net of input growth. This net output growth is commonly measured as growth in aggregate output less a weighted sum (Divisia index) of growth in inputs. This simple Solow residual measure of productivity growth can be written as:

$$\varepsilon_{Yt} = dln\, Y/dt - \Sigma_i\, S_i\, dln\, v_i/dt \tag{2.1}$$

where $S_i$ is the cost share $p_i v_i/\Sigma_i p_i v_i$,[5] $Y$ is output, $v_i$ is the quantity of input $i$, and $p_i$ is the price of input $i$. This measure was initially justified by Robert Solow as the elasticity $\varepsilon_{Yt} = \partial ln\ Y/\partial t$ from a production function $Y(\mathbf{v},t)$. Duality theorems have also established the equivalence of this primal measure with the dual cost-side measure (ie a net cost decrease for a given output level) $\varepsilon_{Ct} = \partial lnC/\partial t = -\varepsilon_{Yt}$, from the cost function $C(Y,\mathbf{p},t)$.

These measures and their underlying duality have been developed and used in numerous places, so I will not embellish this here.[6] Suffice it to say, that the construction as well as the direct duality of these measures depend on a number of important underlying assumptions, in addition to the base assumption that the quantity and price data appropriately reflect their associated effective levels. These assumptions should be well understood, evaluated, and adapted as appropriate, to obtain interpretable and useable measures.

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5 This measure is sometimes motivated in terms of a revenue share, which will be the same as the cost share if the assumption of perfect competition is valid, as well as the assumptions about equilibrium in the factor markets and constant returns to scale discussed below.

6 See, for example, Morrison (1998c) and the associated references. In addition, Morrison (1985) is a useful and accessible overview of these issues.

Another important and closely related concern is that expression (2.1) results in a residual that is composed of all sorts of things, which exacerbates interpretation problems. If the base assumptions hold, and the data represent all outputs and inputs and are appropriately constructed, the resulting measure may be interpreted as a technical change measure. For real-world situations, however, the important issue for interpretation is, what *else* is going on under — and buried in — this measure?

The assumptions underlying the construction and measurement of (2.1) are sufficiently stringent that they will not hold in the real world no matter how carefully the researcher attempts to construct the data. Various aspects of the market, technological and regulatory structure that we would ideally want to identify separately are usually embodied in this residual measure. To separate these out and interpret what is actually going on again requires thoughtful consideration of the conceptual basis underlying these measures.

The theoretical assumptions underlying the construction of this measure can be illuminated with either graphical or mathematical analysis and have appeared in a number of accessible references so I will not elaborate further here.[7] The bottom line is that productivity growth equations such as (2.1) are implicitly based on simple graphical analysis; they are meant to measure something specific (in this case technical change), holding other parts of the productive structure 'fixed', and assuming away the existence of various other complicating factors. It is a very limited picture if taken at face value.

For example, although this measure is designed to measure technical change, even biased technical change will cause the simple duality structure and formulas to break down, since technical change is assumed to happen via parallel shifts in isoquants. Assumptions such as constant returns to scale are also imbedded in the duality relationship, and are even more restrictive than might initially be thought because the actual cost-output relationship may be very complex, as discussed below. Such assumptions are implicitly built into the construction of the cost-side measure, and although they are not as crucial for *construction* of the primal-side measure they cannot be disentangled in this framework.

More specifically in the context of microeconomic reform, the impacts of changing market structure are buried along with growth, scale and other economies, increasing technical and allocative efficiency, and any other causes of efficiency increases or growth (other than measured input changes) that might provide insights about appropriate policy. Clearly, in order to identify

[7] See in particular the references cited in the previous footnote, plus Morrison (1992a, 1992b).

patterns and guide decisions involving economic performance, these determinants of productivity and growth need to be untangled as much as possible both theoretically and empirically. The question is, how to accomplish this?

Sometimes these types of factors underlying economic performance are simply appended to the measured productivity growth indexes in an ad-hoc manner. Edward Denison, for example, recognises more than 20 factors that might provide partial ‘explanations’ of the productivity residual independent of advances in knowledge. The growth accounting procedures utilised for such an exercise are useful conceptual tools, but generate questionable conclusions since there is little theoretical basis for measuring the effects, or linking them with the productivity growth measure in (2.1). Thus, these procedures are both conceptually and empirically limited.

One would instead hope that our theory could directly provide a thinking structure about both what is swept under the rug and how to adjust the measures accordingly. Pursuing this requires developing a consistent method for representing the linkages, and ultimately generating empirical estimates, of these interrelationships.

Furthering this goal initially requires careful identification of the many restrictive underlying assumptions and their potential roles in productive performance. These assumptions can primarily be divided into issues of technological, market, and regulatory structure (although there is obviously some overlap among these concepts). Addressing these issues also returns us to questions about measuring true or economic prices for inputs and outputs.

## 2.5 What about ‘imperfect markets’?

The fundamental issue related to all three of these questions about economic structure is that productivity measures are typically based on the underlying assumption of markets not only existing but working in all output and input markets. Before even thinking of *measuring* deviations from these assumptions about ‘perfect markets’, we have to think carefully about the meaning of market imperfection. Then we can consider what might be done if observed values do not reflect their ‘real’ counterparts.

More specifically, the assumption that observed market prices represent true marginal benefits or costs might be broken down by technological factors such as input market rigidities or lumpiness. These may stem from adjustment costs and mobility constraints, or discontinuities due to large required physical or human capital investments. Technological biases may also cause different optimal input or output compositional impacts in the short as compared to the long run or at different scales of operations.[8]

Market imperfections arising from concentration and resulting in potential monopoly (oligopoly) or monopsony (oligopsony) power may also cause observed average prices to differ from their marginal counterparts. In addition, regulatory distortions from direct regulation, investment, hiring, trade or other incentives, price supports, or other governmental policies, may distort prices that firms respond to or keep firms from responding to existing market prices.

It is important that these types of technological, market and regulatory structural characteristics be taken into account in order to measure, interpret and use measures of economic performance. We will come back to all of these more specifically below, but the overall issue is whether observed or shadow prices may be more appropriate for productivity analysis, and how the real or shadow economic prices may be measured if that seems desirable. The answer to the first question typically depends on how the measures are interpreted and used. The second involves careful representation of the technological and market structure, since straight (non-parametric) data analysis is rarely sufficient to untangle these different forces, since observed data reflect average values.

Let us first elaborate about market structure factors. The deviation here from our standard intermediate microeconomic analysis is that pricing decisions are being made based on perceived output demand and input supply conditions, rather than quantity decisions being made based on observed prices. Although some of this is dealt with in intermediate theory in the context of analysing monopoly or monopsony behaviour, the complexities underlying real markets require us to be very vigilant in linking these elementary models to real world situations, and thinking about technological and economic forces assumed away that may be operating in these situations.

For example, imperfect output markets are often thought to involve deviations between output price and marginal costs, which in turn mean something is ‘wrong’. First, how to measure marginal cost, and also what technological factors might underlie the cost structure, are critically important here to motivate and interpret measures of such market characteristics. Second, it is *not* necessarily the case that the marginal cost is the ‘ideal’ a ‘competitive market’ should aim for; it depends on these technological factors. ‘Bad’ behaviour in output markets would seem to involve excessive profitability or quantity limitations. However, sustainable or viable markets *and* efficiency may entail average prices that deviate from marginal cost in both the short run (due to large

8 Jorgenson (1988) and Morrison (1998a) provide examples of technological and other biases and their estimation.

fixed costs) and the long run (if there are scale, scope and other cost economies).

Thus, measuring and evaluating the existence and impacts of 'market power', and determining what *should* be happening, depends on these technological factors and on what questions are being asked. We have to *think* about the application of our theories to useable measures and policy guidance, rather than using 'pat' notions from elementary theory. The conceptual basis is crucial here; our theory provides a thinking structure to work from, but this pre-supposes that we will also think about how to use it.

What *is* 'imperfect competition' or 'market power', and what is 'bad' and 'good' here? How do these relate to cost conditions? How do 'sunk costs', 'abuse of market power', 'excessive concentration' and other (emotive) buzz words relate to our analysis and conclusions? For example, 'bigger' is often thought to be bad, but what if it allows taking advantage of different types of economies, thus allowing everyone to be better off? It is not as clear cut as we sometimes make it out to be. What are our goals?

Regulatory effects also may impinge on existing economic efficiency and growth, and on the potential for generating greater productive performance. Again, these effects may cause observed prices to differ from economic prices if, for example, incentive programs are in effect. If these programs are designed to accommodate lack of markets, then this may ultimately be optimal. If not, this distortion may prove costly in terms of allocative efficiency, since firms are responding to distorted prices.

Technical efficiency may also be affected if, say, the types of machinery used in production are regulated. Again, however, this may be economically optimal if it adapts for lack of markets, for example with food safety. In this case, the productivity measurement issue may be unmeasured outputs, such as food quality.

Thus, both technical and allocative efficiency may be adversely affected by regulation, but in reverse, the perceived distortions have to be carefully assessed to determine their causes and consequences. Best practice techniques are important to facilitate, but *how* this might be accomplished may not be clear. Numerous issues must be taken into account in order to evaluate the image of distortions or lack of efficiency, and the appropriate or optimal policy.

In addition to affecting efficiency and productivity *levels*, economic *responses* of firms may be affected by regulation. That is, changes in regulations will induce measured productivity changes, and real changes must be distilled from the appearance of changes in the observed data. For example, if price supports are reduced so prices drop this must be separated from changes in physical output or quality. Balances within commodity aggregates — both output and input composition — may also change due to changes in regulatory incentives.

Regulations also have international as well as domestic effects. Again, it may be optimal to enhance market interactions by, say, providing information about international markets to potential exporters who may not have access to such information. There may also be good reasons for maintaining domestic markets in critical products. In this sense, in some cases regulatory 'distortions' may not be 'bads'.

However, policy changes that *do* remove distortions and increase competitiveness and efficiency may have *measured* effects that at least initially appear sub-optimal. For example, increasing competitiveness by opening markets may cause efficiency increases, and yet potentially also cause domestic firms to incur additional costs, particularly in the short term as adjustment takes place. Long-term cost increases may even be promoted by such policy action if firms change output composition or quality in their scramble to compete internationally. These effects must be distinguished from cost inefficiency for interpretation of economic performance and evaluation of policy changes.

Increasing import competition should ultimately be good for consumers if it decreases prices, and for the nation if it promotes efficiency in domestic markets.[9] However, the potential for short-run distress for firms raises distributional issues for evaluating productivity and efficiency as policy reforms are implemented. In particular, the speed at which this takes place could have important impacts, since *rapid* reform could cause adjustment problems that exacerbate already difficult changes for firms and industries, and could potentially damage them excessively, particularly with imperfect financial markets.[10] Note also that such adjustment difficulties could impinge on labourers and other factor owners, and thus have a broader web of impacts, which will impact on both the level and change in measured economic 'health' subsequent to regulatory changes.

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9 Trade factors were included as a cost-determinant, for example, in Morrison (1997b).

10 For example, this appears to have been the case for the extremely rapid reform in New Zealand, as suggested in Morrison, Frengley and Johnston (1998). In this case, regulatory reform changed price incentives, stimulating output compositional changes, but heavy adjustment costs appear to have been caused in the process.

## 2.6 Linking the technological or cost structure with the market structure

Last but *not* least, the technological structure has important implications for the measurement of productive performance and evaluation of market and regulatory structure. That is, both the representation of costs, *and* assessment of whether distortions from market structure or regulation actually exist, depend on aspects of the cost structure.

In particular, typical productivity measures depend on the assumption of constant returns to scale (CRTS), especially when constructed as dual cost-side measures, which is particularly relevant when evaluating the cost structure and efficiency of firms or industries.[11] The critical notion that I want to emphasise here is that there are numerous factors affecting the cost-output relationship that are swept under the rug by this simplistic assumption. For example, capacity utilisation fluctuations are assumed away, and therefore their impacts will appear as changes in productivity that are not identifiable as short-run scale or utilisation effects. If capacity utilisation improves for some reason, such as a sudden increase in demand for the product, this will appear as greater net output and thus efficiency. It is true that this may be one aspect of efficiency change, but it is a short-run effect that does not necessarily imply better production or welfare, at least in the long term. In any case, it should be identified separately for appropriate interpretation of what is affecting the economic health of a firm, industry or nation.

The question that immediately arises is, how to deal with this? Like many of the issues I am raising, some insights about utilisation impacts could be gained, and interpretation of productivity measures improved, from more analysis of published capacity utilisation measures. However, a more economic notion of capacity utilisation has to do with shadow prices, and whether the shadow or true economic value of, say, quasi-fixed capital, is equivalent to the market price. Although I will not pursue this further here, recognising this distortion from the usual assumption that market prices reflect the economic value of an input or output is important for construction and interpretation of economic performance measures.

Long-run scale economies are also an issue. In particular, if the technology is such that substantial units of capital must be purchased, or other technological factors cause large-scale operations to be more efficient, this aspect of productive performance should be independently identified. Importantly, scale

[11] For primal measures the assumption of CRTS is not directly made, but any scale economies are included in the residual and not independently discernible.

economies imply that marginal costs fall short of average costs. If this aspect of the technological structure is not recognised, policy measures to reduce market power or concentration could have the impact of increasing costs, and thus reducing overall efficiency, in the industry.

Another component of cost economies has to do with *biased* technical change or scale effects. That is, it may be the case that technical change or scale economies have differential impacts across inputs. This could be important if, for example, employment is a policy concern, and yet technical change or scale economies are labour-saving.

A final element of cost economies that may provide useful insights about efficiency has to do with the 'jointness' of production, as embodied in scope or specialisation economies. That is, increasing the number of products produced by a particular plant or firm could augment efficiency if scope economies exist. This could also provide insights about why larger, more diversified plants or firms may prevail in an industry, or why vertical or horizontal integration may persist, that has efficiency connotations rather than raising concern about market power. Other types of jointness could also exist, such as multi-plant economies if technological or information spillovers, or spreading of overhead costs, facilitate lower costs of production.

Thus, all these aspects of the technological and cost structure are very important to recognise for appropriate measurement and interpretation of productive performance, and particularly the use of such measures to evaluate questions of market structure.

Another characteristic of the technological structure has to do with forces at work outside the plant or firm, but internal to the industry, region, or country. For example, external effects and spillovers may arise from various types of private and public investments, such as education, R&D, high-technology and information capital, or public infrastructure. These kinds of factors augment growth rather than just maintain efficiency, and so are very important to consider when evaluating current economic performance and the potential for generating long-term performance increases.

These types of effects are particularly important to think about in terms of the level of aggregation over which measurement of economic performance may take place, since their effects will be internalised in more highly aggregated data. For example, high-technology capital may generate spillovers across plants in a particular firm (multi-plant economies), which are internalised in firm-level data. Externalities across firms may stem from supplier or consumer 'agglomeration' economies or thick market effects. R&D or human capital investment may have cross-industry and possibly even international impacts.

All the different components of the potential scale or cost-output relationship highlighted in this sub-section are important to recognise and untangle for a clear interpretation of efficiency, productivity, and growth. Careful representation of the cost structure is important for measurement and particularly for the interpretation of existing and potential productive performance.

Again, dealing with these issues involves the question of whether observed market prices reflect the true economic costs or benefits that drive economic performance and ultimately welfare. Any of the market, regulatory or technological distortions discussed above may cut this tie.

## 2.7 Some pet peeves

This general discussion of productivity and cost evaluation in the context of market imperfections leads me to a few specific 'pet peeves' about the construction and use of productive performance measures, particularly when market structure issues are the focus of the analysis, as is often the case for microeconomic reform. These widespread concerns are not only aggravating but potentially dangerous when used as the basis for policy decisions.

The two primary issues I would like to raise, that feed into other more specific ones, are:

- lack of consideration of the cost structure for evaluation of distortions; and
- using rules (like competition implies $p=MC$) or buzzwords (like 'sunk costs', 'perfect competition', 'market power') without thinking about what they mean or where they come from.

The crucial issue again is to understand the underlying conceptual basis before deciding what is good and what is bad about the existing production structure.

That is, if there is one message I wish most to convey in this general conceptual discussion, it is the importance for economic performance measurement to first *think* about what the underlying economic concepts *mean* before addressing how to measure and interpret them. Problems with generating such a conceptual basis may arise from using elementary economic theory rules without thinking about them, or from using sophisticated analysis to build an argument on a weak conceptual foundation that is masked by the high-powered theory.

So, if microeconomic reform is designed to promote competition and efficiency, it is crucial to define exactly what these involve in the real world. Only then can we attempt to measure, explain, and change the competitive structure and efficiency of production.

To elaborate, my first and overriding pet peeve has to do with basing critical analyses on simplistic assumptions about the cost structure. There are numerous issues about the cost structure that are crucial for understanding the productive and market structure and how policy changes would affect them. These issues may be illustrated by some particular examples relevant to microeconomic reform in Australia with which I have recently been associated.

The first example involves the meat industry. I have recently done a study for the United States Department of Agriculture on the United States beef packing industry. This industry is quite concentrated, with relatively few large plants and three major firms in the market. Combined with concerns in the farming community about 'low' prices paid for farm animal inputs, this has raised the issue of whether market power (especially monopsony power) may exist in this industry. It has also stimulated questions about what might have driven the increased concentration observed in the past two decades.

These questions fundamentally have to do with the cost structure. First, if cost economies exist in the industry, this could cause increased concentration since larger plants and firms would be more competitive. This could generate additional profits for the plants or firms, but could also, if sufficient competition exists, allow products to be sold at lower prices than might otherwise be the case. It might also cause larger firms with greater capacity to be willing to pay higher prices for inputs in order to increase throughput and thus produce at higher utilisation (lower cost) levels.[12]

If such cost economies and utilisation issues exist, however, the usual 'tests' of market power that price ($p$) and marginal cost ($MC$) are equal for outputs, or price and shadow value are equal for inputs, become more complex. In particular, this could mean that marginal cost falls short of average cost due to scale economies, but that profitability is not excessive since output price corresponds closely to average cost. Such a deviation would then be driven by the cost rather than market structure.

The $p=MC$ test in this case is ultimately misleading because this notion of 'competitiveness' fails. The test, even if $MC$ is appropriately measured, is based on assumptions that do not hold in the real world.

12 See Morrison (1998a, 1998b) for a detailed discussion of the extensions to basic theory that may be used to incorporate these characteristics of a particular market if they are deemed important for the analysis.

That is, market competitiveness in this case depends on whether excessive profits are being made. If not, there may still be reasons for regulatory action, for example, to push production to the point where price equates with marginal cost by subsidising the inframarginal units to maintain sustainable production. Such implications are far different than if ‘abuse of market power’ is occurring.

Related issues have arisen with respect to other ‘monopolistic’ industries such as utilities and telecommunications. Although it could be a good thing to break up monopoly power in an industry, care must be taken when evaluating the existence of monopoly and the optimal implementation of such policies.

In particular, if we wish to increase the size of the ‘pot’ rather than just say ‘big is bad’ and cut firms in pieces, we have to think about whether there are scale or other cost economies that are being lost. This involves incorporating these market characteristics into the analysis, as in the meat industry studies referred to above. If market characteristics suggest, for example, that scale, scope, multi-plant or other cost economies prevail as important determinants of cost efficiency, these must be built into the model in order to assess their impacts.

Also, in order to guide policy about what is the ‘correct’ price level, we must be very precise about whether the $p=MC$ test is valid, and what the appropriate marginal cost measure might be. $MC$ in this case must take into account all economic costs, including payment to capital in place if the industry is to be viable. These are not sunk costs in terms of the sustainability of the firm and the industry. Using these buzzwords carelessly can be misleading.

The issue in both these cases has to do with the definition of competitiveness. Pat rules such as ‘$p=MC$ in a competitive industry’ must be used with great caution.

*Why* such rules hold in the context of intermediate microeconomic theory models must be thought about carefully. The notion motivating this theory is that for a given price, a perfectly competitive firm will keep producing in the short run even if average costs are not covered, as long as some payment is being made toward fixed costs. This does *not* suggest that this is viable in the long run, or that a firm would *choose* to price at this level, particularly when fixed costs are high! What the cost structure looks like, and what costs should be covered by a ‘justifiable’ price, must be carefully defined and measured.

In summary, we have to be very careful about emotive words, buzzwords, and pat rules from elementary theory when measuring and evaluating distortions from market structure or regulation. This is especially true if the analysis is based on sophisticated theory that is founded on the weak foundation of a simplistic cost analysis. Drop the buzzwords, or at least define and use them carefully. *Think* about what words like perfect competition, sunk costs, or market power really mean. Precisely define what is wrong about a given scenario, and what should be true. Excessive profits and low production, not just price differing from marginal cost, imply 'bad' or inefficient production.

## 2.8 Conclusion

So, the overall issue I have been dancing around is the construction, interpretation and use of economic performance measures for directing and evaluating policy efforts in the presence of technological and market structure imperfections and regulatory distortions. The primary point is that we need to *use* our economic structure to guide the construction of measures, and their application to policy questions.

We need to define our concepts and resulting measures as precisely as possible, or at least interpret them as clearly as possible, in light of the issues I have raised. We need to determine what the goals of measurement and ultimately policy choices are — what is good and bad and how to measure and interpret productivity/economic performance in this context. Overall, we need to *think* about how our theory provides a structure for measurement and evaluation of productivity and economic performance. Only then will we have measures that provide useful guidance for policy implementation.

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## **Discussant** — *Tim Coelli*

First of all, I would like to begin by saying that there is very little in this paper with which I disagree. I think Catherine Morrison has provided a comprehensive and stimulating discussion of the key issues in productivity analysis. Given the page and time limits, I think she has done very well.

What I am going to do is quickly go through a list of what I think are the key points in Morrison's paper. I am going to expand on a couple of these, and I am going to add a few of my own, and hopefully make some contribution in that way.

### Catherine Morrison's key points

I think one of the key points that Morrison made was to *consider the validity of the underlying assumptions in the methods that we use*. We could be using either a primal production function or a dual cost function or Tornqvist indices to measure productivity. What are the assumptions that underlie these particular methods? One of the key assumptions that is made when we use dual cost functions or Tornqvist or Fisher indices is that of cost minimising behaviour. This assumption is required to derive these methods.

Now, when analysing industries in which microeconomic reform is being considered (or has been implemented), we are likely to be looking at industries where there is some kind of imperfection, be it market based, regulatory or technology based, or whatever. Hence, we can expect that in the majority of the studies that we want to look at, these assumptions, these basic textbook assumptions, are not going to hold and we are going to have to think more carefully about the implications these assumptions have for our analyses. This is the first key point that I got from the session paper.

The second key point is the issue of *short run* versus *long run***.** Morrison did not dwell on this for very long, although it is one of the key areas of her research. In particular, she has done quite a lot of work looking at issues related to *capacity utilisation* and looking at the ways in which one can adjust total factor productivity (TFP) measures and other analyses for these types of short-run factors.[13] I think this work is important, especially when one is trying to measure the impact of microeconomic reform upon productivity growth in the

[13] Total factor productivity (TFP) is used in these discussant comments to refer to the productivity of all inputs to production. It is a measure that recognises intermediate transactions in materials and services along with capital and labour as production inputs and gross output as a measure of output. (See the definitions of multifactor and total factor productivity at the front of this volume.)

first few years following the implementation of the reform. In this case, a lot of what you could be picking up could simply be changes due to demand changes affecting capacity utilisation in either a positive or negative direction.

Also, the effects of reform may not appear in the short run due to *adjustment costs or lags*. In recent years, I have been supervising a PhD student from Mongolia, looking at the effects of reforms in Mongolia both before Perestroika and after Perestroika. From our analysis of the literature, there appear to be quite a lot of examples where attempts to measure the benefits of reform indicated that the reforms had been a failure. However, what in effect was being measured were adjustment costs. It took some time for the input markets to adjust to changes in demand, as well as for the businesses themselves to adjust their production processes to face the new market structures.

However, when one considers a longer time-span, say at least 5 years after the main reforms, you tend to see these adjustment costs have worked their way through the system and then you actually begin to pick up the effects of the original reforms in your empirical analyses. Hence, we must take care not to damn a particular reform within the first couple of years, until these adjustment costs have worked through.

Morrison made important comments on *distributional and welfare issues*, and I think that they obviously need to be focused upon. Another point that was made was associated with the choice of *market prices* versus *shadow prices*. This is something that I have worked on. It is clear that in well-defined perfect-competition textbook examples we can use market prices. However, as Morrison notes, in some instances it is necessary for us to consider shadow prices and to look at appropriate methods for identifying, measuring and incorporating these prices in our analyses.

The one point that I would like to note here is that there are cases in which some estimates of ‘shadow prices’ can be misleading as well. In a recent analysis that I did of productivity change in the electricity industry in Australia during the eighties and early nineties, I used a primal approach. I was hence using shadow prices rather than market prices in my TFP measurement. What I observed in that particular analysis was that the shadow price of labour was very close to zero. Hence, what came out of my analysis was a message that there was very little TFP improvement in the five years around 1990, even though there had been quite a lot of labour shedding in the industry during this time.

I obtained this result because my shadow price was saying that labour was worthless. Hence, I was concluding that TFP was not improving that much, when in fact, if we used a market price to weight labour, we would have found faster TFP growth. So there are pitfalls in either direction. Certainly, do look at shadow prices, but use them carefully.

I could not agree more with the comment on the *misuse of the p=MC rule*. There are a number of exceptions to this rule — in the short run due to large fixed costs, or in the long run due to scale and scope economies. These are obviously important issues that must be considered. It is interesting to note that my electricity work (mentioned above) suggested that there are still unexploited scale economies in electricity generation in Australia.

Finally, we cannot emphasise too much the issues of *quality changes* and *environmental issues*. A lot of our TFP measures are going to rely very heavily upon being able to get good measures of output in *all* industries. There are many cases where this will be difficult. For example, measuring quality changes in the computer industry, output measurement in the service industries, and obviously environmental issues come in as well. Hopefully, I have done some degree of service to Catherine Morrison's paper in identifying what I think are the main points — points which I think will come up again and again as we go through the remainder of this workshop.

## What is productivity?

I think it is important for us to precisely define what we mean by 'productivity'. In her paper, Morrison carefully stated that she believed that productivity had a technical component, (technical change, technical efficiency and related issues) and an allocative efficiency component as well. Now, if we look at most of the textbook definitions of TFP measurement involving:

- production functions,
- dual cost functions, and
- Tornqvist/Fisher indices,

what we find is that the definitions essentially assume that TFP is equivalent to technical change.

These methods are built upon particular sets of assumptions. For example, methods 2 and 3 rely upon the important assumption of allocative efficiency. Now, in many industries where there are distortions (as discussed above), these particular assumptions would not apply. Furthermore, we have the implicit assumptions of technical efficiency, constant returns to scale and so forth, associated with some of these approaches. The main point I want to make, is that if we define productivity as it tends to be defined in the textbooks, then we are saying it is purely technical change. We should therefore carefully look at what we are measuring, because there are likely to be the effects of allocative efficiency, technical efficiency and scale economies caught up in our productivity measures.

The potential effect of allocative inefficiency upon a Tornqvist TFP index calculated over two periods, is illustrated in Figure 2.D1. In this diagram, we have a firm using two inputs ($x_1$ and $x_2$) to produce a single output. We assume constant returns to scale and hence may represent the technology using the unit isoquant PP′. We also assume that the firm is technically efficient and that there is no technical change between period one and two, the time horizon of our analysis. Finally, we assume some underlying undistorted prices (eg the border prices) are exogenously determined and that the price ratio for the two inputs is the same in both periods. The price ratio for the two inputs is represented by the slope of the isocost line CC′ in Figure 2.D1. In the second period, the firm faces these prices and responds by producing at point *t*. However, due to factors outside of the control of the firm (such as a quota or tariff on imports, or government regulation), the firms adopts the input combination *s* also on PP′ in the first period.

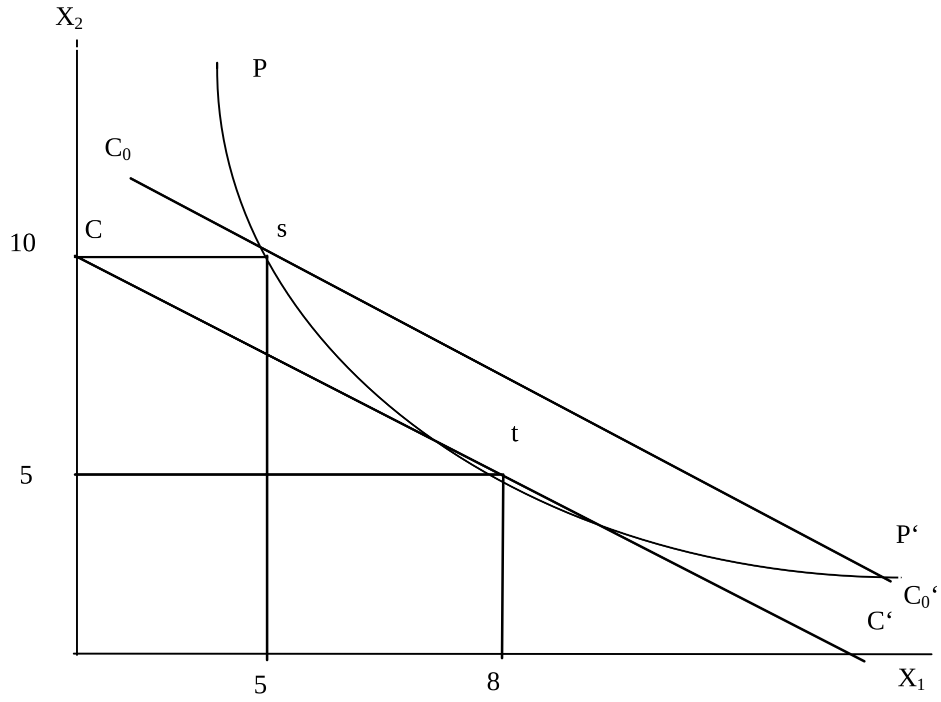
The assumption of technical efficiency ensures that the input combination *s* in period one and *t* in period two, are both on PP′. The move from the year one production point at *s* to the year two production point at *t*, indicates an improvement in allocative efficiency. This is reflected by a parallel shift in the isocost line from $C_0C_0'$ to CC′ in Figure 2.D1.

Now, if a Tornqvist index of TFP growth is assumed to be just a measure of technical change, because both *s* and *t* are technically efficient input combinations, it would be expected that calculations of productivity growth using the index would show no ‘productivity’ change from period one to period two. However, if we actually calculate the index (assuming the undistorted prices of inputs $x_1$ and $x_2$ are \$7 and \$4, respectively), we observe that the Tornqvist input index of the change between periods one and two is:

$$\text{Input Index} = X^T = \prod_{i=1}^{N} \left[ \frac{q_{i2}}{q_{i1}} \right]^{(\omega_{i1}+\omega_{i2})/2} = \left( \frac{5}{10} \right)^{0\ 65} * \left( \frac{8}{5} \right)^{0\ 35} = 0.75$$

where $\omega_{iT}$ is the cost share of the input *i* in time-period *T=1,2*. Hence, given that the output index equals 1, we find that the TFP index is equal to 1/0.75 = 1.33. The improvement in allocative efficiency is therefore also reflected by a 33 per cent improvement in productivity in the TFP calculation.

Figure 2.D1: **Allocative efficiency and total factor productivity index numbers**




The interpretative difficulty is that the Tornqvist index of TFP is frequently derived assuming allocative efficiency in both periods. Where does this leave us:

- should we use these methods when we suspect that the allocative efficiency assumption may not apply?
- when we know the assumption does not apply, should we use 'undistorted' or other 'shadow' prices as weights? or
- should we use a method which does not directly rely upon information about prices , such as the production function approach?

Use of the second method would mean that our productivity measures will reflect improvements in productivity in terms of some undistorted numeraire price and therefore will reflect both changes in allocative and technical efficiency. Use of the third method would mean our 'productivity' measure will not reflect any allocative improvements.

It is clearly important for us to carefully define what we mean by 'productivity'. Is it purely a measure of technical change, or does it also include allocative efficiency? Once this is done, we can then begin to discuss how we may attempt to measure productivity.

## **Discussant** — *Ian Castles*

Catherine Morrison's incisive paper carries a simple message. We must not use words such as 'productivity' casually and imprecisely, without thinking carefully about what they mean or where they come from. She spells out this message in a variety of ways, but the central point is that we must '...first *think* about what the underlying economic concepts *mean* before addressing how to measure and interpret them.'

The observation that we need to think first may seem trite. Regrettably, however, measures of productivity and other measures of economic performance are often used without thought about their proper interpretation and meaning. 'Productivity' is an 'OK' word: at one time Australia had a Minister and a Department for it, now we are to have a Commission for it. But what is 'it'?

Morrison lists some specific 'pet peeves' about the construction and use of measures of economic performance in contexts in which, in her words, their use is 'not only aggravating but potentially dangerous'. In the remainder of this comment, I will examine an important recent example of the unwise use of productivity measures in policies relating to the Australian Public Service (APS).

In May 1991, Australia's Minister for Industrial Relations announced that workplace bargaining within the APS was henceforth to be based on 'measurable and demonstrable changes in workplace productivity' (DIR 1991, p. 68). Teams of experts and committees of heads of agencies were charged with preparing reports, outlining the means of implementing such a system and settling on 'Practical definitions and measurements of productivity ... noting that these may vary between and within agencies ...'.

No report had been produced to show why workplace bargaining should desirably 'be based on measurable and demonstrable changes in workplace productivity'. This was apparently regarded as axiomatic. The reports of the experts and agency heads explained that it was really impossible to measure productivity in the non-market sector, but they did not consider why, measurement problems aside, the remuneration of public servants should depend on changes in their productivity in the workplace.

More than 30 years earlier, Wilfred Salter of this University had pointed out that 'Businessmen — despite what they say at productivity congresses — are interested in prices, costs and profits, and to them increasing productivity is simply one means of reducing labour costs' (Salter 1960, p. 3). Salter's pathbreaking analysis of British and American official statistics led him to stress the importance of ‘ensuring that comparable labour has the same price in expanding and declining industries’ and he warned that:

> The argument that an industry cannot ‘afford’ higher wages is, in the long run, extremely dangerous. If it were accepted and wages were based on the ‘capacity to pay’, employment would be perpetuated ... in industries which should properly decline to make way for more vigorous industries. Equally dangerous is the argument that industries which are prosperous because of new techniques have the ‘capacity to pay’ high wages. This would penalise the expanding industries on which so much depends. (Salter 1960, p.153)

Salter showed that differential increases in productivity were reflected almost entirely in the structure of prices. Thus, increases in productivity had not resulted in higher relative earnings of the labour employed in the industries where the increases had taken place. He concluded that:

> This result is heartening for two reasons. In the first place it suggests that there is no significant tendency for productivity gains to be appropriated at their source by strong trade unions. If this had been the case, workers in industries where the greatest productivity gains had occurred would have fared better than their colleagues in less progressive industries. Fortunately, there is no evidence of such a narrow division of the gains. The second reason why this result is heartening concerns the sources of increased productivity. Businessmen have no direct interest in increased productivity for its own sake: to them increased productivity is simply a means of reducing costs. If strong unions (or some statutory agreement) led to a situation where increases in productivity in each firm or industry were automatically accompanied by increased earnings, the incentives to increased productivity would thereby be weakened; for the effect on costs of increased productivity would be much less. A similar argument applies to those increases in productivity which originate in structural change. If wages and productivity were linked together in each industry, the inter-industry structure of costs and prices would be less responsive to unequal productivity movements. This would seriously inhibit the structural changes which make such an important contribution to increases in aggregate productivity. (Salter 1960, p.157)

In these days of cynicism about the value and importance of serious empirical research into productivity and its measurement, of the kind undertaken by the Industry Commission and by Dowrick and his colleagues in academia, it is worth recalling the comments on Salter’s evidence which were made by each of the members of the Full Bench of the Commonwealth Conciliation and Arbitration (C&A) Commission in their separate Judgments in the Basic Wage Inquiry of 1959.

Chief Justice Kirby described Salter as ‘an impressive and interesting witness on this subject’, and said that he felt ‘that research of the type he has undertaken should be encouraged in particular relation to the functions of this Commission’. Justice Gallagher said that Salter, ‘an economist with outstanding qualifications' had given 'interesting, informative and illuminating evidence'. And Justice Foster, recognising Salter as 'an economist with a very wide reputation and a specialist on productivity measurement', said that his evidence was 'very satisfying' and had been 'undertaken with a grave sense of responsibility to the Commission and the community and with a jealous regard of his own high reputation' (*Commonwealth Arbitration Reports*, 1958–59, pp. 691, 707, 717 and 732).

The members of the Commission disagreed on many subjects, but they were fully persuaded of the validity of Salter's conclusion, based on years of painstaking research and careful analysis, that the linking of wages to productivity on an industry basis was unfair and self-defeating.

Salter had been called to give evidence at the basic wage hearing by the advocate for the Australian Council of Trade Unions (ACTU), R J Hawke. The workplace bargaining policy adopted by the Commonwealth Government in 1991, which envisaged the linking of wages to productivity on an agency-by-agency basis, was decided upon by a Cabinet chaired by the Prime Minister, Hon. R J Hawke.

Morrison has told us of some of her 'pet peeves' about the construction and use of measures of productive performance without careful prior thought about what those measures mean. Most of us have our own 'pet peeves', such as the example I have just given. Some of our peeves relate to failures in public policy, perhaps because politicians and officials have not understood that there is something to think about.

If public policies are to be better informed, there will need to be a wider recognition of the value of research into productivity and its measurement, and careful thought about the implications of the results of that research. The Industry Commission and the ANU are to be congratulated for organising this workshop and, in particular, for choosing Catherine Morrison to make an opening presentation which obliges all of us, from the outset, to think about the difficult conceptual and measurement issues which are concealed in apparently simple 'buzzwords'.

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## General discussion

The discussion focused on two broad issues:

- the determinants of innovation; and
- methodological problems associated with measuring economic performance.

### Innovation

Three potential sources of growth were identified — improvements in allocative efficiency, improvements in productive efficiency and technological change.

Innovation and entrepreneurship were identified as key determinants of technological change. It was suggested that microeconomic reforms which directly affect productivity growth and welfare through the removal of barriers to resource flows may also have an impact on innovation. As a result of this, the workshop needed to focus on the linkage between policies designed to improve resource allocation and productive efficiency, and their subsequent impact upon innovation and technological change.

There was concern that our understanding of the determinants of innovation is incomplete. In particular, it was noted that at present, economic theory is unable to predict some key effects of microeconomic reforms. For example, a Schumpeterian analysis of competition policy reforms might suggest that such reforms will not necessarily generate growth, since the reduction in rents associated with increased competition may discourage innovation. On the other hand, it may be the case that in an environment where greater competition is encouraged and structural barriers are removed, resources would be directed away from rent seeking activities into greater innovation. However, it is not clear that the resources that are released by improved efficiency and decreased rent seeking activity necessarily flow into innovation. The overall result is that the effect of microeconomic reform on innovation is ambiguous.

There was general agreement that any assessment of the effect of microeconomic reforms upon productivity growth would benefit from a better understanding of the effects of microeconomic reforms on innovation.

### Methodological problems

A number of methodological problems associated with economic performance measurement were discussed. These included the difficulties of measuring economic performance in service industries, the handling of stochastic factors and determining the source of welfare gains.

Service industries, such as education, health, welfare and defence, pose severe problems when it comes to productivity measurement. Typically, it is difficult to obtain accurate data on both inputs and outputs for such industries. In addition, it is often difficult to control for quality changes. Outcome measures, such as changes in health status following the purchase of medical care, are often used to approximate the corresponding output measures. Survey results on consumer satisfaction are also used. One interpretation placed on the use of outcomes as a proxy for output was that researchers were trying to embed a quality component into their output estimates. Given the difficulty of measuring output and the importance of controlling for quality differences in service industries, it was also suggested that the use of outcome measures provides one bound on the appropriate measure of output. The importance of trying various alternative output and input measures as a form of sensitivity testing was also stressed.

The majority of the measures of productivity growth mentioned in the session paper were identified as deterministic. The various index number methods that are popular in productivity analysis were singled out in this respect. By implication, the basic methodology did not explicitly account for the stochastic nature of the data used to calculate the index numbers. In view of this characteristic, a concern was expressed that, without a fairly sophisticated treatment of stochastic elements, limited reliance should be placed on studies of comparative efficiency. Morrison suggested that problems in estimating productivity changes caused by stochastic data highlighted the importance of using appropriate econometric techniques.

The difficulty of identifying the separate contribution of each of the sources of growth to aggregate productivity measures was raised. The sources of growth identified were changes in allocative efficiency, changes in productive efficiency and technological change. For example, it is easy to confuse productive inefficiency with technological change, or to incorrectly interpret the effects of a missing variable from a data set as productive inefficiency. It was recognised that the main focus of research has been on distinguishing between productive efficiency improvements and technological change.

Finally, the relative merits of different approaches to measuring productivity growth were discussed. Micro-level, or bottom-up approaches provide a great deal of structural information at the individual industry level, while macro-level, or top-down approaches allow the bigger picture to be examined. Both approaches provide useful information. The main drawback of micro-level approaches is their partial nature, while the main drawback of macro-level approaches is their lack of sectoral detail. Morrison and Coelli expressed a preference for starting with a micro orientation to productivity analysis. In their view, such an orientation provides a better perspective on the technological and market structure of a particular activity, and provides a useful place to begin productivity analysis.

# 3 THE EFFECTS OF MICROECONOMIC REFORMS ON PRODUCT AND FACTOR MARKETS

*John Freebairn*

## 3.1 Introduction

Microeconomic reform encompasses a range of government policies which change incentives facing private and public sector producers with the aim of inducing higher levels of productivity to support higher living standards. The policy focus is on the supply side and on the production and pricing decisions of individual firms. Policies affecting factor and product markets, and those affecting private sector firms, government business enterprises and government departments are included. Initial effects of greater productive and allocative efficiency show up as increased multifactor productivity, at least as a one-off increase and sometimes also as a sustained increase in the growth rate. Improved productivity across firms leads to outward shifts of product supply curves, shifts in derived factor demand curves, and subsequent second round changes in prices, quantities and incomes. These important second round adjustments require a general equilibrium framework for analysis. Realised higher living standards are effected by a combination of lower product prices, higher wages, and higher returns on capital.

The aim of this paper is to bring together a framework for tracing through the effects of microeconomic reform. In particular, it seeks to follow the transmission paths and mechanisms from the policy effects to changes in incentives, to improved productivity, to changes in prices and quantities of industries and factors, through to increases in the aggregate level of national consumption capacity and changes in its distribution. The paper draws heavily on detailed documentation of the microeconomic reform agenda, and projections of the effects of reform, collated in annual reports of the Industries Assistance Commission and its successor the Industry Commission from 1988–89 to the present, Productivity Commission (1996), and the volumes of Forsyth (1992) and Quiggin (1996). The purpose is to offer a logical and consistent framework for understanding the complex path of effects of microeconomic reform and for focussing debate on the conduct of, and evaluation of, studies seeking to quantify the effects of microeconomic reform.

## 3.2 Microeconomic reform, incentives and productivity

From a supply side perspective, output and potential consumption is given by the aggregate production function:

$$Q = f(L, K, N) \qquad (3.1)$$

where $Q$ is output, broadly interpreted to include public and private goods and services, and $L$, $K$, and $N$ are the factor inputs labour, capital and natural resources. Microeconomic reform is concerned not with changing the input levels, but with the effectiveness or productivity by which the inputs are transformed into output. In particular, microeconomic reform is concerned with increasing a measure of multifactor productivity:

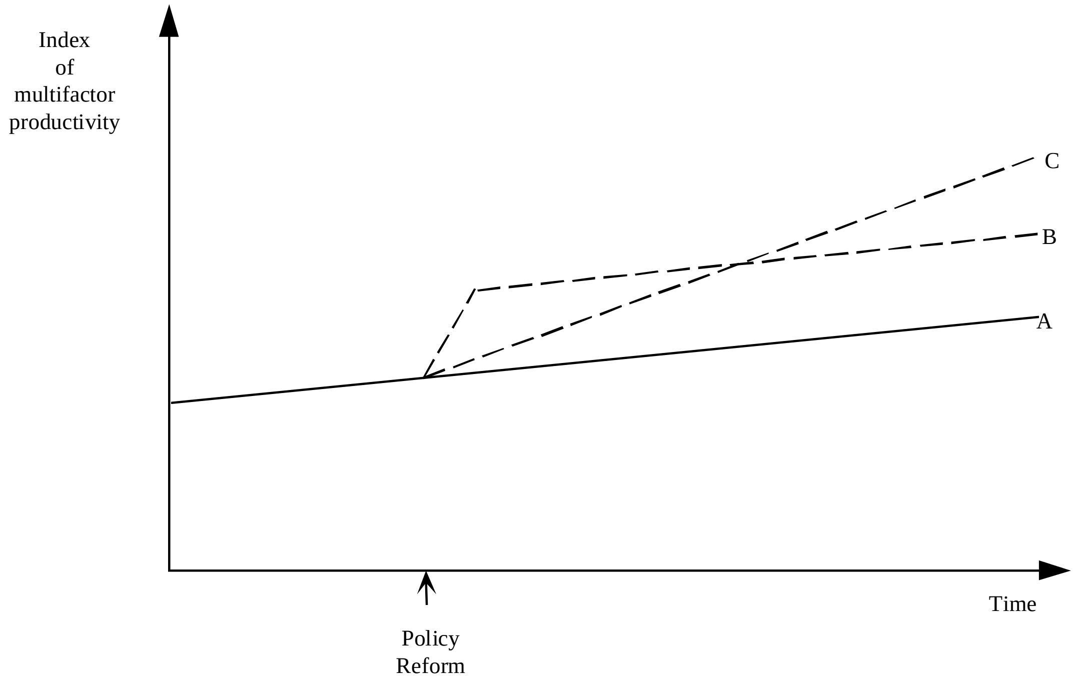
$$P = Q/g(L, K, N) \qquad (3.2)$$

where $g(L, K, N)$ is some index of the factor inputs.

The effect of microeconomic reform via increases in multifactor productivity can be seen in two contexts. First, as a one-off increase in the productivity index $P$, albeit achieved over several years. Except for the jump period, there would be no sustained increase in the growth rate of productivity. Second, the reforms may be reflected more as an increase in the growth rate of multifactor productivity. Figure 3.1 highlights these differences. Curve $A$ shows the path of multifactor productivity in the absence of microeconomic policy reform. The effect of reform is shown as curve $B$ for a one-off productivity improvement, and by curve $C$ for an increase in the growth rate. Most Australian discussion, including numerical work by the Industry Commission, evaluates a one-off productivity jump. However, it is arguable (see below) that both a one-off jump and an increase in the growth rate of productivity might be expected.

Measuring the initial impact of microeconomic reform via its effect on productivity is useful in interpreting reported estimates of the benefits of reform. As noted by Forsyth (1992), Industry Commission studies and others using the ORANI/MONASH models allow changes in the $L$ and $K$ inputs in reporting benefits of microeconomic reform as increases in GDP, a portion of which is due to more inputs. Others, and in some cases Quiggin (1996) belongs to this group, argue that the inevitable structural changes which are part and parcel of microeconomic reform will, by redundancies, reduce the aggregate employment of factors. A simplifying base case analysis would hold aggregate factor usage constant or focus gain measures not on GDP but on multifactor productivity.

Figure 3.1: **The effects of microeconomic reform on multifactor productivity**




Alternatively, the additional and more challenging step would investigate the effects of microeconomic reform also on macroeconomic outcomes. Here analysis would need to evaluate why the starting macroeconomic point is one of under utilisation of some labour and capital inputs; and by what mechanisms microeconomic reform would reduce restrictions on expanding aggregate demand and increasing employment of labour and capital. Both are areas of considerable controversy in macroeconomics. In the interest of space, these difficult areas are not explored further in this paper, but this is not meant to deny their importance.

Rather, the paper will focus on ways in which government policy changes incentives facing production in the private and public sector and as a result, leads to increases in productivity. For ease of exposition, these effects are considered under the sub-headings of allocative efficiency and productive efficiency, although overlaps clearly are pervasive.

### 3.2.1 Allocative efficiency

Policy changes which work to shift private costs and benefits more into line with social costs and benefits will improve the efficiency by which scarce inputs and outputs are allocated. The policy changes might be directed at correcting market failures, at reversing distortions in existing government regulations, and in meeting other government objectives at a lower efficiency cost.

There are numerous areas of market failure in which government intervention has the potential to improve resource allocation efficiency relative to a private market allocation. Monopolistic behaviour, including that associated with natural monopoly, results in price and marginal social benefits exceeding marginal private and social cost. Policy options include reducing statutory monopolies, for example in transport and communication, monitoring and if warranted actions to break-down excessive horizontal integration, opening-up competition to international trade and substitutes, and in the case of natural monopolies some form of maximum price regulation. Externalities, both external 'bads' such as pollution and external 'goods' such as primary education, where property rights are poorly defined will lead to too much and too little production and consumption allocation decisions if left to private markets. Microeconomic policy actions to better define property rights, to apply taxes and subsidies at marginal externality levels, and in some cases quantitative regulations, which bring outputs to levels equating marginal social costs and benefits will improve allocative efficiency. Extensive government intervention to increase production and consumption of public goods, such as defence and basic research, characterised by non-rival consumption and high costs of exclusion, also can improve economic efficiency.

However, the above public interest theory of government intervention provides a necessary case only for government intervention. It is not easy to turn the potential gains of intervention into reality because of inadequate information. Further, the private interest theory of regulation warns that governments, politicians and bureaucrats may behave in self interest ways and be driven by pressure groups with redistributional objectives at variance with a social optimum. That is, as well as market failure there is government failure. Successful microeconomic reform would include institutional arrangements and policies which curb both market failure and government failure.

A second area of microeconomic reform to improve economic efficiency concerns reversing the distorting effects of many government policies now in place. An old and still important example is tariff and non-tariff barriers which raise domestic prices to producers and consumers above the social opportunity cost represented by world prices. Other examples include: monopolistic protection of government owned enterprises, including electricity, water and rail, and formerly air and telecommunications; not setting prices for government provided services at marginal costs, for example water; and extensive cross-subsidisation, for example residential and business users of electricity, and rural and urban telecommunications and post. Here microeconomic reform is not always deregulation *per se*, but rather setting prices and charges to reflect marginal social opportunity costs.

Microeconomic reform can improve allocative efficiency in a third area by reducing the efficiency costs of meeting other society objectives. A good example is in the area of redistribution to meet social equity goals. Direct social security grants tied to those to be assisted are almost always more effective than redistribution via intervention in product and factor markets. Broad and comprehensive tax bases involve lower distorting costs per dollar of revenue collected than narrow bases with exemptions, concessions and deductions. The use of tradeable permits and taxes are likely to achieve targeted reductions in pollution at lower cost than non-tradeable quotas and regulations because the price signals are more flexible in helping to find and reward those who can reduce pollution at lowest cost.

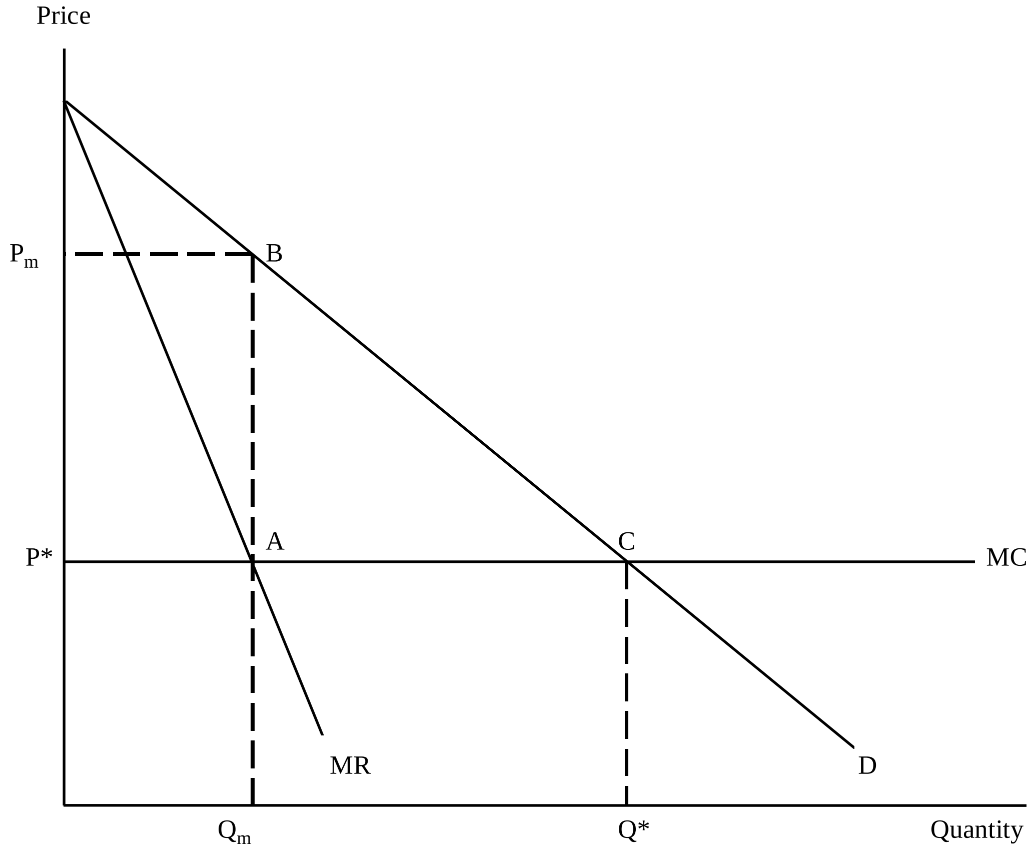
Measurement of allocative efficiency gains can be illustrated for a simple monopoly situation and generalisations then follow. Consider Figure 3.2, which depicts a constant cost industry with *MC* assumed to equal social marginal cost as well as private cost, and industry demand is given by *D*. A monopolist would choose output $Q_m$ and price $P_m$. The monopoly price, relative to the social optimum price $P^*$, is related to the elasticity of demand. With the set price above the efficient level, an efficiency loss to society of area *ABC* arises. Microeconomic reform to reduce monopoly improves allocative efficiency by reducing the wedge between the market price and the marginal social cost price and thereby driving area *ABC* towards zero.

The monopoly illustration readily generalises. Microeconomic policy that generally narrows the wedge between market prices and marginal social costs, including lower trade restrictions, smaller cross subsidies, corrections for externalities and public goods, and less distorting ways of meeting other government objectives, reduces allocative distortions and improves economic efficiency. The efficiency costs of price distortions as a share of national income, and hence the potential benefits of microeconomic reform, can be approximated by the equation:

$$L = (0.50*S*E*t^2)*100 \tag{3.3}$$

where *L* is the loss expressed as a percentage of national income, *S* is the share of the industry or factor market in the economy, *E* is the (absolute) value of the behavioural price response elasticity, and *t* is the price distortion as a proportion of the social marginal cost.

Figure 3.2: **Efficiency costs and distributional effects of monopoly**




Inspection of equation (3.3) provides useful insights on the potential allocative efficiency gains of microeconomic reform. First, the gains often are relatively small. Combinations of important shares of the distorted sector in the economy ($S > 0.05$), elastic response elasticities ($E > 1.0$) and high effective tax burdens ($t > 0.6$) are required for allocative efficiency gains to exceed 1 per cent of national income. Second, gains are more important for small reductions in very large distortions, that is where *t* exceeds 0.5, than for large reductions in small distortions, because efficiency costs rise more than proportionately with the deviation from efficient pricing.

Microeconomic reform to achieve allocative efficiency gains may generate much larger gains for society than the Harberger triangles discussed above by reducing the incentives for and rewards from rent seeking behaviour. Consider, by way of illustration, the monopoly story in Figure 3.2 again. Maintenance of a monopoly position provides the monopolist with a profit of $P^*P_mBA$, generally a very much larger sum than the efficiency triangle $ABC$. The monopoly rent may be taken as higher shareholder profits, as better worker conditions and pay, by management perks, or more likely by some combination of these. The incumbent stakeholders have an incentive to spend on lobbying and related activities up to the redistributive rent in building-up and maintaining government monopoly protection, or lack of vigilance and public scrutiny. Also, government is likely to outlay some resources to combat pressure group lobbying. Microeconomic reform which reduces monopoly, trade assistance, cross subsidies and so forth will reduce the incentives and rewards of these lobbying and associated activities, and this in turn will release resources for production of goods and services which expand national consumption capacity.

Allocative efficiency gains are a large share by number of the list of microeconomic reforms canvassed by the Industry Commission, Forsyth, Quiggin, and others. For reasons noted in equation (3.3), the potential contributions to increased productivity are significant but they are relatively less important as a share of the likely aggregate benefits of microeconomic reform than suggested by the number of reforms. While rent seeking costs have been acknowledged, it does not seem that any values have been included in empirical estimates of the benefits of microeconomic reform.

### 3.2.2 Productive efficiency

Policy changes can be directed to increase the incentives for firms, both private and public, to evaluate and better meet buyer needs, to adapt to and implement technology more quickly, and to implement more productive management and work practices. Improvements in productivity show up directly as increases in multifactor productivity in much the same way as technological advances in genetic material, new products, lower cost production processes, and so forth. Effectively, the marginal cost or supply curve, such as in Figure 3.2, is shifted downwards.

Greater competitive pressures directed at changing incentives in favour of faster adoption of world best practices might be pushed by several arms of microeconomic reform policy. Reducing protection against international competition opens the market to a broader set of ideas and technologies, it may allow greater utilisation of economies of scale and scope and increased intra-industry trade, and the extra choice options available to buyers enables them to place more pressure on domestic producers to improve productivity.

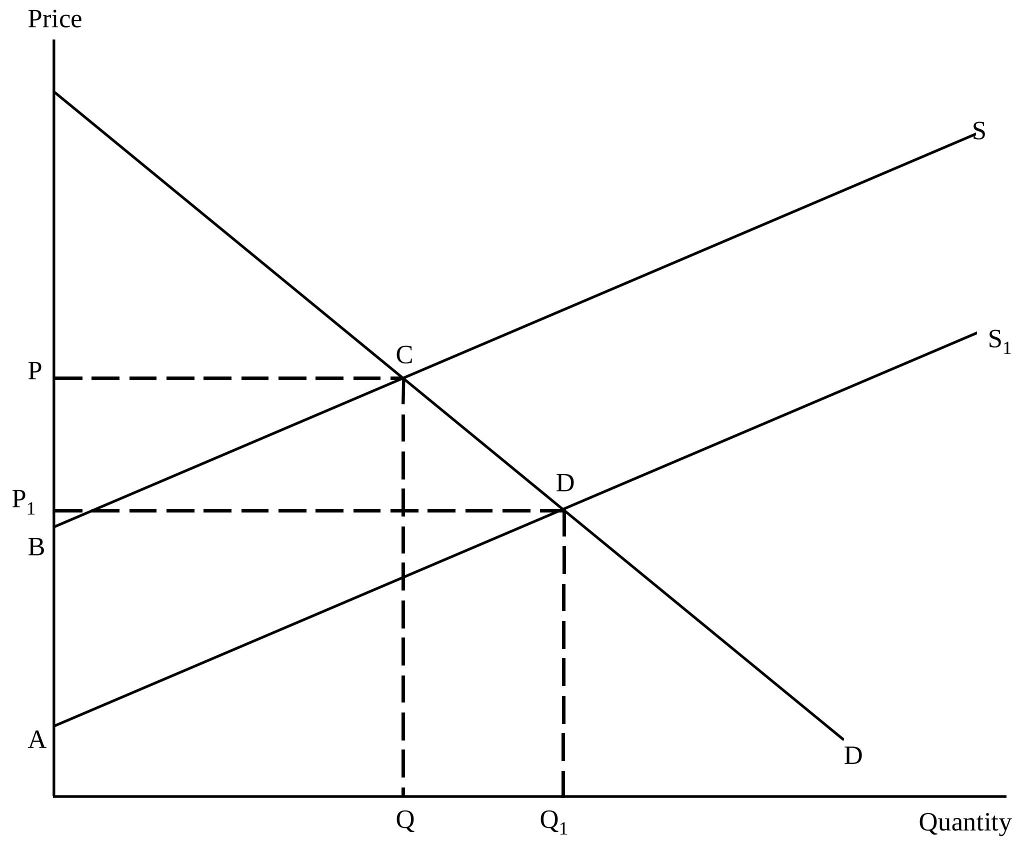
Opening up competitive options for the supply of government goods and services has similar motivations. Anti-monopoly structures and practices, such as implemented under the Australian Competition and Consumer Commission (ACCC), are motivated as much to achieve these dynamic gains of productive efficiency as they are to reap the static allocative efficiency gains discussed above.

Much of the current discussion on changes to the operation of labour markets and industrial relations is about improving the productivity of labour management and work relations. One set of ideas behind enterprise bargains, as opposed to craft, industry or even national awards, is to open up the experimental field for innovative contracts conditional on the needs of particular and individual enterprises. Other ideas involve more direct contact and discussion between employers and employees, rather than using a third person quasi-legal tribunal as an intermediary, and introducing more contestability in union representation. Factor market flexibility complements greater product market competition in speeding up adoption of world best practices and in more quickly responding to changes in market and production circumstances, especially when the changes are difficult, costly or impossible to forecast.

The effects and benefits of increases in productive efficiency can be illustrated with a partial equilibrium model for a product shown in Figure 3.3. In the absence of strong competitive pressures demand $D$ and supply $S$ generate a market outcome of price $P$ and quantity $Q$. Microeconomic reform increasing competitive pressures leads to the adoption of better technologies, work practices, management practices, etc, which drive the supply curve outwards to $S_1$; improvements in product quality and attention to buyer needs may shift demand outwards. At the new supply, industry output expands to $Q_1$ and price falls to $P_1$. Area *ABCD* is a measure of the increase in economic surplus, or of the benefits of microeconomic reform.

Productive efficiency gains of microeconomic reform generate rectangles of gains which can be compared with the generally smaller triangles of gains of allocative efficiency. The challenge for the analyst seeking to quantify gains is to measure the supply curve shift. In its work, the Industry Commission has made considerable use of benchmarking against international best practice. Filmer and Dao (1994) made extensive use of surveys of business enterprises, which in turn ultimately rely heavily on comparisons of current against best practice.

Figure 3.3: **Partial equilibrium model of benefits of productive efficiency improvements**




In addition to the one-off gains in moving to world best practice with improvements in productive efficiency, it might be argued that there will be continuing improvements and a sustained increase in the productivity growth rate (path *C* in Figure 3.1). Adaptation, change and fine tuning production methods primarily is a continuous process of relatively small changes rather than a sequence of infrequent and lumpy jumps. Competition is a continuing and ever vigilant process rewarding innovators and penalising laggards. Much of Australian microeconomic reform in recent times, and that envisaged in the near future, is directed to breaking down artificial monopoly restrictions and to increasing contestability in factor and product markets.

## 3.3 Productivity effects on market outcomes

Microeconomic reform induced improvements in productive efficiency and allocative efficiency have significant second-round effects on other product and factor markets in addition to the first round market initially affected. A detailed and high level of disaggregation of products and factors in a general equilibrium analysis is necessary to capture both first and second round responses in order to measure net outcomes. This section discusses some of the likely first and second round responses, initially for productive efficiency gains and then for allocative efficiency gains.

### 3.3.1 Productive efficiency

Before microeconomic reform, the flow of receipts and outlays for an industry can be represented as:

$$P.Q\ (L, K) - L.W - K.R = 0 \qquad (3.4)$$

where $P$ is price. $Q$ is output as a function of inputs labour and capital as in (3.1), but with the natural resource input suppressed for simplicity, $W$ is the wage rate, and $R$ is a residual return on capital and including profit so that receipts equal factor payments. In (3.4), the initial effect of productivity growth is to increase $Q$ for given inputs, or to reduce one or both of the inputs required for the same output. So long as demand is not perfectly inelastic, (3.4) will be driven to a surplus with an increase in productive efficiency. This initial effect puts pressure on $P$ to fall, for $W$ to rise, for $R$ to rise, or some combination. Each of these first round effects set off a train of second round shocks to other parts of the economy.

Suppose the increase in output is placed on the market with prices falling. Figure 3.3 illustrates the outcome. Lower prices is a likely response where competition is effective, and especially over time as all firms adopt the improvements, and this is one of the intermediate targets of microeconomic reform. Further, if supply is close to perfectly elastic, price will fall by the net productivity gain. For most industries which are relatively small users of national labour and capital and not dependent on specific inputs, the long-run elastic supply assumption is a reasonable approximation and the factor input prices will change very little. Subsequent expansion of industry output to meet the increase in demand because of lower prices will be larger the more elastic is industry demand.

Lower prices flowing from microeconomic reform have a number of important second round effects on other parts of the economy. For those industries or portions of output purchased by final consumers, consumer real purchasing power rises. If consumer demand is elastic, the percentage sale expansion exceeds the percentage price reduction and productivity increase, so that input use by the industry clearly increases. Alternatively, if consumer demand is inelastic, the sale expansion is less than the price reduction and industry input use may fall, but lower consumer outlays on this product release income for increased expenditure on other goods and services.

For those industries producing intermediate inputs, as is the case for much infrastructure which is the subject of microeconomic reform, the lower prices reduce input and production costs for other industries. In turn, these industries become more profitable, expand production, employment and sales, and reduce their prices.

In a general equilibrium context, microeconomic reform in a particular industry will have effects on other industries driven by scale effects and by changes in comparative advantage. Increased productivity leads to higher real incomes, with income elastic products and their input supplies gaining more than those with low income elastic products. Comparative advantage will move in favour of those industries initially benefiting from the productivity gains and those closely linked as suppliers of key inputs or as further processors of outputs. In net, the industry initially affected by the productivity improvement, and those closely related to it, expand output. For other industries, the net change in output depends on the balance of positive scale effects and the comparative advantage loss effect. In these cases, an empirical assessment is required to determine the net effect.

Returning to equation (3.4), suppose that the reaction to a productivity improvement is not to increase quantity and reduce price, but rather to use less resources and to use the surplus created to increase returns to labour, higher wages $W$, or to capital, higher profits $R$. Higher wages might be a part of a bargain to implement productivity improvements. The higher capital return as residual claimant is partly a reward for entrepreneurial success not quickly eroded by competition. In the case of government business enterprises, and government departments, the higher capital return might be reflected as a lower loss or call on taxation revenue or as a greater contribution to government revenue than before the productivity improvement. The higher factor returns will be reflected in an increase in aggregate demand, and in increases in activity in most other industries in the economy, via a mixture of direct and indirect increases in expenditure.

Direct links from higher factor prices to increased aggregate demand include increased consumption outlays by households receiving higher wages and dividends and increased investment outlays by business. In the case of investment, the higher returns provide incentives for an increase in outlays and the capacity to fund investment. Some of the extra incomes are likely to be saved, and perhaps more so in the transition period while expectations adjust.

Higher savings will indirectly stimulate aggregate expenditure in at least two ways. The additional supply of savings will reduce interest rates and stimulate investment across the economy. Also, the increase in private savings means a smaller call on foreign savings, inducing a currency depreciation to stimulate an increase in net exports to match the fall in net foreign capital inflow.

### 3.3.2 Allocative efficiency

Microeconomic reform to achieve allocative efficiency gains involves changes in relative prices seen by businesses and households, and in particular it tries to bring private prices and costs more into line with social prices and costs. While some of the relative price changes are explicit and readily obvious, some are quite subtle. For example, lower tariffs on textiles, clothing, footwear and leather goods (TCF) and automobiles clearly reduce prices of imported TCF and automobile products and bring competitive pressures to reduce prices on domestic substitutes. More subtly, the inflow of more imports puts pressure for a currency depreciation which favours export industries and other import competing industries relative to non-traded industries. Again, removing cross subsidies for electricity from industry to households has indirect relative price effects on electricity intensive products relative to other products.

The effects of allocative efficiency gains on the structure of the economy depend very much on the specific microeconomic reform. For example, reduced monopoly power in industry *A* will expand output and factor use in industry *A* and closely interlinked activities, it will draw resources from other industries, and output and consumption of most other products will contract; tariff reductions for product *B* will reduce output and employment of *B*, but consumption will rise, and there will be increased output in the other parts of the economy; and reducing cross subsidies in industry *C* may principally affect the composition of sales of *C* with a much smaller effect on aggregate sales and employment in *C*.

The net effects of microeconomic reform to improve allocative efficiency involve scale effects and compositional effects. The overall improvement in efficiency and consumption capacity provides a positive sum game, and these scale effects are more important for products with high income elasticities. Changes in relative prices alter the comparative advantages of industries, and of factors, and induce changes in the composition of the economy, with some illustrations given above. Empirical estimates with computable general equilibrium models indicate that in most cases the compositional effects are much more important than the scale effects in the case of allocative efficiency improvements.

### 3.3.3 Employment and distribution

Microeconomic reform changes the composition of industries and occupations and often changes work practices. These changes are a necessary aspect of productivity improvement to raise living standards. Inevitably the changes destroy some jobs, but at the same time they create other jobs. In this sense microeconomic reform is not unlike changes in tastes, technology, international trade and other forces bearing on modern economies. In order to assess the effects of microeconomic reform on employment and its distribution, it is important to consider in a general equilibrium framework both the first round effects and wider second round effects on other parts of the economy.

Often, but not always, the first round effects of microeconomic reform are reduced jobs. For example, tariff cuts to industry *A* reduce domestic production and employment in industry *A*; measures to increase labour productivity in industry *B* reduce the numbers required to produce current output, and so forth. Redundancies, voluntary or compulsory, are readily apparent, although often exaggerated to include redundancies whose real cause is elsewhere, such as tastes and technology. Of special concern is that some of those made redundant do not have skills for other industries. These effects seem inevitable for some microeconomic reforms.

However, as has already being emphasised, no complete analysis can end at the first round effects. In many cases of productive efficiency gains, microeconomic reform flows through to lower prices and more industry output. If demand is elastic, aggregate employment in the industry will expand, not contract. But, the skill composition changes may still leave some employees redundant.

More generally, microeconomic reform via income or scale effects and by changes in comparative advantage effects leads to higher levels of output in other industries and their employment rises. Importantly, as argued by Dixon, Parmenter and Rimmer (1997), the faster growth than otherwise of these other industries both creates jobs and reduces redundancies. For example, lower tariffs for TCF and the associated expansion of agriculture and other export sectors creates new jobs and saves some low skilled agricultural and other workers from redundancy. Clearly, these second round effects are subtle and difficult to quantify, at least relative to the first round losses, but they are a necessary part of the analysis.

An overall assessment of the net effects of the job change, job destruction and job creation effects of microeconomic reform necessarily requires the use of a computable general equilibrium model. Because the productivity benefits of microeconomic reform raise effective production capacity and because a large part of gains in productive efficiency are transformed into lower prices, the presumption of a net gain is attractive. This is the outcome of ORANI/MONASH model simulations reported by the Industry Commission, Bureau of Industry Economics (1990) and the modellers themselves.

Microeconomic reform in Australia has been cast over a wide set of industries and all factor markets. In this context, particular reforms may adversely affect one industry, say tariff cuts on motor vehicles, but the benefits of other areas of reform, such as improvements in production efficiency in electricity and transport, are such as to provide an overall net gain for output and employment in the motor vehicle industry. Simulation results by the Industry Commission show that the broad set of microeconomic reforms of current interest would, if implemented, increase output for all industry sectors and increase employment across all occupational divisions. Packaging of a comprehensive reform agenda in this way can lead to winners all round.

## 3.4 Concluding comments

Productivity growth is a key requirement for, and route for, achieving higher per capita living standards. There is now a large body of evidence that productivity levels in most of the Australian public and private sectors are well below, 20 per cent or more, world best practice, and there are numerous examples where market prices are some distance from social marginal costs. Here lies a major opportunity for Australia to improve its production capacity and consumption opportunities, broadly interpreted.

Microeconomic reform seeks to change incentives facing firms in product and factor markets across the economy in order to tap into the reservoir of potential productivity improvements. It seeks better forms and levels of intervention for market failures, to reduce unnecessary statutory and other impediments to competition, and to reduce the efficiency costs of meeting equity and other social objectives. In most cases, the allocative efficiency gains will be relatively small and largely one-off. Productive efficiency gains seem to be larger in terms of potential increases in productivity and to raise the growth rate of productivity as well as the level. Economic theory and quantitative tools are more developed to measure the static allocative efficiency gains than the dynamic productive efficiency gains.

Improved productivity, including that driven by microeconomic reform, involves changes, and particularly changes which flow through to other industries. It is clear that general equilibrium modelling is necessary to properly analyse the full impacts of microeconomic reform on the economy, on different industries, on employment, and on the distribution of benefits. Net effects on industries reflect positive scale effects of a larger economy and composition effects driven by changes in the relative comparative advantage of different industries. Jobs are both created and destroyed. Available studies find that the package of microeconomic reform proposals under consideration in Australia will result in net gains for all industries and components in the workforce.

There are at least two important areas in which analytical and theoretical frameworks for understanding the effects of microeconomic reform could benefit from further work. The first concerns measurement of the effect of reforms on improved productive efficiency, both as a one-off effect and as a sustained higher growth rate effect. Current procedures, heavily dependent on benchmark comparisons, seem to provide an optimistic ceiling estimate. Second, the interplay of microeconomic reform, macroeconomic responses, and the aggregate levels of labour and capital used is an intriguing area of analysis. For computable general equilibrium modellers this issue arises in terms of assumptions about the appropriate model closure. Most of the reported studies project that microeconomic reform will induce higher levels of labour and capital inputs as well as increases in productivity.

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## **Discussant** — *Stephen King*

John Freebairn's paper provides an excellent overview of the potential gains from microeconomic reform. I will address three key questions raised by his paper. First, what are the gains from microeconomic reform and, at a theoretical level, are these gains as simple as suggested by the paper? Secondly, the term 'microeconomic reform' is used to describe a wide range of policies. Can these policies really be grouped together? In particular, are all of these policies likely to lead to positive economic benefits or are some parts of 'microeconomic reform' ambiguous and potentially harmful to the economy? Thirdly, reform inevitably leads to a redistribution of society's wealth. Microeconomic reform has succeeded in reducing government intervention in many areas. But this success has not been uniformly supported and some groups lose from ongoing reform. These groups have organised to oppose further reform and reverse current changes. Has the success of microeconomic reform sown the seeds of its future failure?

### The gains from microeconomic reform

As Freebairn points out in his paper, reform can lead to gains in both allocative and productive efficiency. What is the size of these potential gains?

The allocative loss created by inefficient (or monopoly) pricing is given by the standard Harberger dead-weight-loss triangle. There have been many attempts to measure the size of these allocative losses, both in Australia and overseas. Estimates of these losses vary widely. For example, measures of the total allocative loss from monopoly pricing in the United States vary from 0.1 per cent of Gross National Product (GNP) to 6 per cent of GNP (Carlton and Perloff 1994). In Australia, it has been estimated that the allocative loss due to monopoly pricing is around 0.5 per cent of Gross Domestic Product (GDP) but may be as high as 1.5 per cent of GDP (Dixon and Gunther 1996).

It is difficult to judge whether these gains are small or large. If national income can be raised by 0.1 per cent simply by changing some misguided policies and there are few associated transition costs, then the gains should be seized. Conversely, if changing policy leads to significant long-term social upheaval and substantial transition costs, then a potential static gain of even 6 per cent of national income may be more than offset by short-term costs and a policy change will be socially detrimental.[1]

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[1] As first noted by Posner (1975), the Harberger triangles may understate the size of allocative losses from inefficient pricing. If firms compete for the privilege of gaining a monopoly status, then this rent-seeking competition will tend to dissipate the monopoly profits made by

The size of the potential allocative gains and losses associated with any specific policy change is an empirical issue. Economic theory, however, raises a more disturbing question. Are there really any gains to be seized?

Economics, like nature, abhors a vacuum. If there is a 'free lunch' to be gained, then economics tells us that we should see someone out there, knife and fork at the ready. If there is no one trying to eat the free lunch then it probably does not exist. But this creates a problem for those economists who believe that there are large allocative gains ready to be seized by society simply changing a few policies. Why haven't those gains already been seized? In particular, it is neither in the firm's nor the customers' interest to leave potential allocative gains 'sitting on the table'. An allocative loss from monopoly pricing reflects potential mutually beneficial gains from trade. It is in both the seller's and the buyers' interests to devise a scheme to seize and share these gains.

Of course, in many situations where one firm or a few firms have the ability to set monopoly prices, these firms do establish schemes to maximise the gains from trade. Systems of price discrimination are developed with this purpose. In particular, many large firms use non-linear pricing schemes to both maximise the potential gains from trade and to transfer these gains to profit. While we may prefer the gains from trade to be more equitably distributed between firms and consumers, these pricing schemes achieve one of the goals of microeconomic reform by reducing or eliminating allocative loss.

Put simply, if microeconomic reform can seize allocative gains, why has self-interest not already led market players to devise schemes to seize the gains for themselves?

There are two immediate answers to the above question, both of which have implications for the type of microeconomic reform that is most likely to result in social gain. First, the potential allocative gains may not have been exploited because government policy makes illegal those pricing practices that firms can use to seize the gains. Government policies can limit discriminatory pricing schemes or require regulators rather than firms to set prices. Microeconomic reform must be careful not to exacerbate this situation. The Hilmer report (Hilmer *et al.* 1993). recommended the removal of section 49 of the Australian *Trade Practices Act 1974.* This section limited the scope for legal price discrimination and has now been removed, reflecting the economic understanding that price discrimination often improves welfare. At the same time, however, reforms in the electricity, gas and telecommunications sectors

inefficient pricing. To the degree that some or all of these profits are wasted on directly unproductive rent-seeking activities, the cost of these activities should also be considered as a social loss from monopoly pricing.

have resulted in the creation of new regulatory agencies whose prime responsibilities involve setting prices for private firms. The ACCC, the Independent Pricing and Regulatory Tribunal in New South Wales, and the Office of the Regulator General in Victoria, for example, all have powers to set or approve various prices. Rather than reduce allocative inefficiencies, reforms which move pricing powers from firms and into regulatory agencies may create inefficiencies.

Allocative gains may also remain if firms lack the incentives to seize them. For example, if a firm is publicly owned, and the public manager has no incentive to maximise profits, then that manager also has no incentive to devise pricing schemes or product bundles that will reduce allocative losses. While privatisation or corporatisation may provide an adequate means to alter incentives and eliminate allocative inefficiencies, ownership decisions need to be carefully considered. Removing a firm from public ownership and placing it in private hands will increase profit incentives. Private managers will try to seize allocative losses. They may also try to raise profits by a variety of other activities. If these activities have severe, harmful effects on society, it may be better to suffer a small loss under public ownership than a large loss under private ownership. We return to this issue below.

As noted in Freebairn’s paper, microeconomic reform may also lead to productive gains. Where these gains simply reflect the failure of current firms to minimise costs, then my comments on allocative efficiency above remain valid. Wasting valuable resources by a failure to cost minimise is in no-one’s interest. If we believe that firm’s are not cost-minimising then this will probably reflect either government intrusions or a failure on our part to properly measure all costs. Where cost minimisation is prevented by government policy, there is clear scope for gain. Again, two caveats remain valid. When implementing reform we need to take care not to introduce new restrictions that prevent firms from operating efficiently. Also, when changing policies to improve incentives for cost minimisation, we need to be careful not to create incentives for socially undesirable activities. A firm that produces dioxin as a waste product can minimise costs by dumping this toxic chemical in a nearby lake, river or bay. The social cost of such an activity, however, will vastly outweigh the private benefit.

Productive gains may also reflect improved incentives for research and development. But innovation is not free, so the real issue is not whether there is more research and development following microeconomic reform, but are private and social incentives better aligned after reform? As with any other costly activity, there is an optimal amount of innovation. Are we innovating too rapidly or too slowly at present? In general, we would expect a monopolist who is not subject to any potential competition, to innovate too slowly from a social perspective. If the monopolist successfully lowers its costs through innovation then at least some of these cost savings are likely to be passed on to consumers. To the degree that the benefits from innovation cannot be completely captured by a monopolist, we would expect the monopolist to have too little incentive to innovate.

Will microeconomic reform that increases the level of competition better align public and private incentives? While a monopoly may choose too little innovation, competitive firms may choose to do too much innovation. This is particularly the case where the first firm to innovate can seize most of the gains from this innovation. In a winner-takes-all innovation contest, firms will race each other to be the winner. Competition may result in too rapid innovation from a social perspective. Overall, the productive benefits from microeconomic reform will be ambiguous.

## The gains and losses from microeconomic policy

Some microeconomic reform raises little debate, at least among economists. Protectionism falls into this category. There are few if any economists in Australia who would argue that it would be desirable to raise tariff barriers and other forms of import protection in industries that are currently unprotected. Most economists also agree on the long-term desirability of removing current import protection. While there may be considerable debate on the rate at which this protection is removed, there is little controversy over the long-term goal.[2]

Other microeconomic reform policies are more controversial. Unsurprisingly, these are the policies that are ambiguous. Many microeconomic reform policies involve gains and losses for both individuals and society. These policies need to be carefully evaluated and the potential benefits weighed against the social costs. Unfortunately, in many areas of reform, this careful weighing of alternative outcomes is not occurring.

Privatisation provides an excellent example of a policy associated with microeconomic reform that requires careful, case-by-case evaluation. As noted above, government ownership policies change private incentives. A public manager will often have inadequate incentives to choose activities that improve both profits and social welfare. Even a ‘corporatised’ public manager is unlikely to face the same incentives as a private owner. At the same time, private owners may not face the full social consequences of their actions.

2 For two contrasting discussions on tariff reform in Australia, see Anderson (1993) and Quiggin (1996).

Where private actions lead to external costs or benefits for society, unregulated private ownership may not be optimal. The government's optimal ownership choice will require a careful comparison of the relative costs and benefits of public ownership with any associated managerial incentive schemes, and of private ownership with any relevant regulation. A policy of reform that simply assumes that private ownership with regulation is preferred to public ownership will be misguided.

Consider the following simple example.[3] A manager or owner controls a firm. The value of the firm is given by the asset value $a$. The manager or owner may undertake an action or investment $e$. This action raises the value of the firm, but has negative external social consequences. The social costs of the action are represented by $b$. The manager or owner also faces a cost associated with the action denoted by $c$. The cost may represent a personal utility cost. Assume that the lowest level of the action is given by zero and that $c(0) = b(0) = 0$. Also, assume that the government cannot directly observe the action and that there are no verifiable measures of $a$ or $e$ that the government can use to regulate the owner or manager. Social welfare for any value of $e$ is given by $a(e) - b(e) - c(e)$.[4]

Under public ownership, the manager does not own the firm. Rather the firm belongs to the government which retains the relevant assets and the asset value $a$ at the end of the public manager's tenure. Given the above assumptions, a public manager cannot be provided with any incentives to choose a positive level of $e$. The government is unable to observe $e$ and cannot reward the manager through a proxy measure of the activity. As the activity provides the public manager with a personal cost but no benefit, under public ownership the manager will choose $e = 0$. Social welfare under public ownership is given by $a(0) - b(0) - c(0)$.

Under private ownership, the firm is retained in the owner's hands. The owner can dispose of the firm as he sees fit and he retains the asset value associated with the firm. However, a private owner does not face the full social cost of his actions. Consequently, a private owner will choose a level of $e$ to maximise $a(e) - c(e)$. By our assumptions, the action chosen by a private owner, $e_p$, will be strictly positive. Social welfare under private ownership is given by $a(e_p) - b(e_p) - c(e_p)$.

3 This example is drawn from King and Pitchford (1998).

4 We assume that $a(e)$, $-b(e)$, and $-c(e)$ are all strictly concave and continuously differentiable with $a_e(0) - c_e(0) > 0$.

From a social perspective, the private owner will choose an excessive level of the privately profitable action. A public manager in contrast will choose too little of the action. But it is not obvious which regime is socially optimal. If the external costs associated with the privately profitable action are low, then private ownership, with its strong profit incentives, is likely to be socially desirable. If, however, the external social costs from the privately profitable action are large then public ownership, with its muted profit incentives, may be socially preferred. We cannot say whether privatisation is a desirable microeconomic reform in this simple case without additional information about the external social costs.

While this example is fairly simple, it provides an important lesson. Many microeconomic reforms are desirable in certain situations but are undesirable in others. If policy makers treat microeconomic reform as a simple recipe for economic growth and social efficiency, then society as a whole is likely to suffer. Microeconomic reform is more like a scalpel than a chainsaw. A chainsaw has its place when it is obvious what needs to be cut down. However, if a heart surgeon chose a chainsaw before entering the operating theatre we would hold serious fears for the patient’s welfare. When governments take a chainsaw to microeconomic policy, we should be equally concerned for society’s welfare.

## Does microeconomic reform sow the seeds of its own failure?

Microeconomic reform has become an industry. A number of people (including a number of participants in this conference) have made considerable gains from microeconomic reform. Governments throughout Australia require advice on specific reforms and a number of firms and individuals have seized these opportunities. With significant numbers of jobs for economists being created in government departments and reform units, in newly privatised firms and in the regulatory bodies that are charged with controlling these firms, economists have been clear winners from the reform process.

At the same time, there have been substantial losers from the reform process. These people have not been sitting idle but have been gathering their own teams of lawyers, economists, lobbyists and advisers. Put simply, the opposition to microeconomic reform is growing, particularly from those who stand to lose the most from the reforms. It is likely that these opponents of reform will gather continuing strength, particularly as the obviously beneficial reforms are completed and microeconomic reform relies more on case-by-case analysis.

The 1997 debate on continued tariff reform for the car and the footwear, clothing and textile industries provides a sobering example. Despite recommendations from the Industry Commission (1997a, 1997b), the conservative federal government decided not to push ahead with tariff reductions. This victory for the opponents of microeconomic reform is likely to spur others to more vociferously oppose reforms that affect them adversely. Similarly, there appears to be an increasing reluctance by the Australian Labor Party (ALP) to support reform. While microeconomic reform in the early 1990s was a bipartisan issue, supported by politicians from both major parties, it now appears that the Labor party, both at state and federal levels, is moving to oppose reform. The inability of the state Labor premier in New South Wales to gain the support of his own party for the privatisation of some of the electricity industry, is one example.

When analysing microeconomic reform, many of the 'obvious' changes have already occurred. The continuing reform process will be more difficult and more ambiguous than in the past. At the same time, opposition to the reform process will grow. It is likely that some reforms will slow and possibly be reversed.

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## **Discussant** — *David Borthwick*

Economists with an interest in the practical application of their craft are always on the look out for more convincing ways of persuading governments — and the community at large — to pursue programs of microeconomic reform.

The main stumbling block in that quest is well known: the benefits from individual reforms seem to be small because they are diffused across the economy as a whole, whereas the costs often appear to be large because they are concentrated and thus more obvious.

John Freebairn's paper tries to help us by setting out 'a framework for tracing through the effects of reform'. There is little in his paper with which I would take issue. Nevertheless, let me make a few observations not so much about his paper as such but about issues related to it.

First, I agree with John Freebairn that it is very important that we think about microeconomic reforms using a general equilibrium framework. Decision makers need to know about the effects of reform not only on the industry or activity directly affected but also about the flow-on effects. When the temperature in the old protection debate was raised in the early 1970s, the focus was on: 'where will the new jobs come from'. That question is just as relevant today. General equilibrium analysis can help us. It helps us to shed light on the effects of change affecting one industry for the economy as a whole. This understanding is critical in terms of putting into perspective the claims of vested interests who, understandably, focus primarily on their own situation.

Secondly, although there is almost an insatiable demand for specifying the effects of various reforms, the technical kit bag at our disposal cannot readily allow us to do that. Modelling the effects of tariff changes or of European agricultural support measures is one thing; in these instances, we have good information about likely relative price and income movements. However, for the great bulk of microeconomic or regulatory reform we do not have reliable information. I have much less confidence in our capacity to model the allocative and technical efficiency effects, or general equilibrium effects from, say, the corporate law economic reform program, or of financial market deregulation. And how amenable to this kind of analysis are many of the hundreds of regulatory reviews being conducted at Commonwealth or State level coming out of the Competition Policy framework ?

Thirdly, and related to the previous point, much of what we do in terms of microeconomic reform is not about deregulation — it is about regulating in a more effective form. It is, for example, about making sure that we have a sound prudential framework for the financial sector, or about ensuring the right balance of economic and regulatory instruments to protect the environment. And many of these regulations have implications for the overall operating environment of industry and in some instances society more generally.

When you think about all the dimensions of reform, what we are talking about is a framework that goes beyond the rather straight forward concepts of allocative and technical efficiency. Many measures not only have the capacity to lead to one-off improvements in output but, I believe, to on-going growth. For example, I would argue that a deregulated labour market would change the whole incentive structure for labour and capital leading to on-going possibilities for innovation and technological change, thereby enhancing growth prospects.

Fourthly, often all the gains from regulatory reform are not readily observable for another reason. It is important that we benchmark performance, whether that be for an industry or the economy as a whole, as best we can. This gives us some feel for the possible gains in technical efficiency. But those benchmarks are never a fixed point to aspire to. Let me explain: even if we improve our regulatory performance in an absolute sense we can still perform poorly in a relative sense. Witness Australia's relative decline *viz a viz* other countries in terms of GDP per capita. That matters. We cannot sit on our hands and say, in effect, 'the gains from reform are too small to bother'. I happen to believe that the cumulative effects of comprehensive reform programs are large. If we do not press on, it would certainly be a recipe for relative national decline and maybe, should events turn sour, for absolute decline for a prolonged period, as some mismanaged economies have found.

Finally, let me say a few brief words about the interaction of macroeconomic and microeconomic policy. Here we are talking about the twin blades of the scissors: the demand and the supply sides. Both blades will not cut effectively if they are not sharp and operated in unison. There are many issues to consider; let me mention two. Firstly, we have had an interesting debate over the years about whether microeconomic reform can help improve the current account position. My own view is that many microeconomic reforms directly impinge on the efficiency of savings and investment: measures affecting the taxation and financial system being two obvious examples. If we do not utilise savings effectively and investment is squandered in the wrong areas, that certainly effects our overall economic performance and our current account situation. In Asia, we have seen the consequences of the interactions in both directions: too much capital being ill directed and now a capital strike as investors go elsewhere. Secondly, to the extent that we get an outward shift in the supply curve (Freebairn's Figure 3.3), does this enable us to expand demand, consistent with keeping inflation at low levels ? I think that there is something in that. Heightened competitive pressures in product and labour markets and the impact of technology are leading to downward pressure on prices. In my view, this does allow monetary policy to be, on average, a little more accommodating; or at least monetary policy does not have the dead weight of inefficient markets constraining its effectiveness.

In conclusion, John Freebairn's paper provides a framework for thinking about the issues and of categorising the possible effects; it gives us some clues about likely suspects. However, what I find more revealing is that it also tells us how little we really know about the interactions in the economy.

## General discussion

The discussion focussed on three issues:

- the use of computable general equilibrium (CGE) models to estimate the potential welfare gains from prospective microeconomic reform packages;
- the size of allocative efficiency gains; and
- the incidence of rent seeking behaviour.

### Use of CGE models

One participant commented on the use of models in policy analyses and the sensitivity of such analyses to the selection of model closure; that is, the choice of endogenous and exogenous variables. The general equilibrium modelling in the recent Industry Commission reports on passenger motor vehicles and textiles, clothing and footwear were proffered as examples. In the draft report on passenger motor vehicles, real wages were held constant in the model closure, allowing employment to change; while in the final report a more standard long-run closure was used, in which employment was predetermined and real wages were allowed to change. In a comparison of the two approaches, it was observed that the welfare gains were very much larger when total employment was allowed to increase.

### Allocative efficiency

A number of comments were made on the relative importance of allocative efficiency improvements in the assessment of the overall benefits of microeconomic reform. It was evident that there has been, however, a fairly mixed approach to assessing the effects of reforms. Some analyses, such as those adopted in the Industry Commission’s reports on the passenger motor vehicles and textiles, clothing and footwear industries, have focussed on the allocative efficiency gains. This has meant that the effect of reforms on factors such as product variety and economies of scale have not been fully assessed, even though they might be large relative to the gains from improved allocative efficiency. On the other hand, while allocative efficiency gains may often be quite small both absolutely and relative to other benefits, cases do arise where prices are so much greater than marginal costs that the potential allocative efficiency gains from microeconomic reform are substantial and warrant being the focus of analysis. Telecommunications pricing a few years ago was provided as an example of a case in which allocative inefficiency effects were substantial.

### Rent seeking

There was agreement among a number of participants that the incidence of rent seeking activities had increased in recent times. However, views differed concerning the nature of the new rent seeking activities and their links to the microeconomic reform process. King, in his discussant's comments proffered some suggestions in this respect. Another participant observed that proactive rent seeking activities were not new, citing various historical examples from the textiles, clothing and footwear industry in Australia.

It was also suggested that the process of microeconomic reform had changed the nature of rent seeking activities. Formerly, rent seeking activity had mainly benefited an entire industry rather than individual firms. This was largely due to the fact that there were only small numbers of firms in affected industries, with industry-wide protection from imports and other competition benefiting all industry participants. Because a single firm could not capture all of the benefits from rent seeking activity in this environment, individually, they devoted less resources to such activity than they might otherwise have done. However, with an increasing number of firms and a reduction in such industry level protection engendered by the microeconomic reform process, there has been a shift in the type of rents that are being sought. Industry-wide protection has given way to firm-specific advantages. In this new environment, firms capture most of the benefits from their rent seeking activity. They are therefore willing to devote more resources to such activity.

# 4 A GROWTH THEORY PERSPECTIVE ON THE EFFECTS OF MICROECONOMIC REFORM

*John Quiggin*

## 4.1 Introduction

For at least thirty years after World War II, the economic policy debate was dominated by macroeconomic issues. The task of ensuring stable growth with full employment was seen primarily in terms of fiscal, monetary and exchange rate policies. Microeconomic policies were adjusted to meet macroeconomic imperatives. Prudential controls over the financial system, such as the Statutory Reserve Deposit, were used as instruments of monetary policy, and import quotas were used to maintain the exchange rate.

After the breakdown of Keynesian macroeconomic policies in the early 1970s, attention shifted to microeconomic issues. It was hoped that extensive microeconomic reform would eliminate structural rigidities and thereby prepare the way for sustained economic expansion (Kasper 1986).

Reform has been extensive. Although policies of microeconomic reform have affected all sectors of the economy, policies aimed at improving the efficiency of the public sector have been particularly important. Most large government business enterprises have been corporatised and many have been privatised. Policies of competitive tendering and contracting have opened large areas of public service provision to competition from the private sector. Major reforms affecting the private sector include financial deregulation and the reduction of most tariffs to minimal levels.

On the face of it, however, the anticipated improvements in economic performance have not materialised. Unemployment remains high, and growth rates in excess of 4 per cent are widely seen as unsustainable. It has been argued (Quiggin 1996) that, while some reforms have produced small, once-off increases in economic welfare, there is no reason to expect any additional impact on rates of economic growth.

The object of this paper is to examine the relationship between reform policies, including microeconomic reform, and economic growth. The paper is organised as follows. Section 4.2 is a brief summary of microeconomic reform in Australia since the mid-1970s. Section 4.3 deals with theories of economic growth and the idea of dynamic efficiency gains. Section 4.4 is an analysis of the relationship between changes in the level and in the growth rate of national income. In Section 4.5 implications for policies aimed at improving economic performance are derived. Section 4.6 is a summary and assessment of estimates of the effects of reform in Australia. Finally, some concluding comments are offered.

## 4.2 The history of microeconomic reform in Australia

> We have had a decade of remarkable and fundamental economic and social policy reform; reform which in all its major contours and, arguably, in 99 per cent of its detail, is efficiency-enhancing (Higgins 1991, quoted in Gruen and Grattan 1993)

As the quote above indicates, the process of microeconomic reform has been going on in Australia for well over a decade. The process began twenty-five years ago with the 25 per cent tariff cut introduced by the Whitlam government in 1973 and the establishment of the Industries Assistance Commission in 1974.

Although it is often retrospectively characterised as interventionist, during its term in office from 1975 to 1983, the Fraser government was perceived as ‘determinedly reducing the public sector in the cause of greater efficiency’ (Patience and Head 1979 p. 86). The microeconomic reforms introduced by the Fraser government included:

- relaxation of exchange controls and restrictions on foreign investment;
- the end of qualitative controls on bank lending;
- introduction of contract employment for senior public servants;
- the abolition of public service tenure through the *Commonwealth Employees (Redeployment and Retirement) Act 1977*
- the prohibition of ‘secondary boycotts’ under Sections 45D and 45E of the *Trade Practices Act 1974*;
- Closer Economic Relations with New Zealand (agreement signed in 1983, but negotiated earlier); and
- abolition of parallel flights and fares for airlines.

The Fraser government’s industry policy was on balance, one of microeconomic reform, though there were a number of steps in the opposite direction, including increases in tariff and quota protection for the motor vehicles and textile, clothing and footwear industries and the reintroduction of the bounty on superphosphate in 1976. In labour market policy, the macroeconomic objective of winding back the ‘real wage overhang’ led the government to favour a strongly centralised system based on the Arbitration Court, a policy inconsistent with microeconomic reform, and later the 'Wages Pause' of 1982. Even here, Fraser's most enduring legacy has been the prohibition of secondary boycotts through the Trade Practices Act.

Similarly, in its first few years in office, the Hawke government's policies were predominantly, but not wholly, consistent with microeconomic reform. The most notable initiatives were the floating of the dollar in 1983 and the subsequent general financial deregulation, including admission of foreign banks. However, the government also introduced a number of interventionist measures, such as the Prices and Incomes Accord, Medicare and Industry Plans for the steel and motor vehicles industries. As with the Fraser government, macroeconomic concerns were initially regarded as paramount. The reduction in real wages achieved through the Accord and the 'Medi-fiddle' was seen as more important than labour market flexibility or the provision of price signals in markets for health care.

It was only from 1986 onwards that the advocates of microeconomic reform completely dominated the policy process. The 'banana republic' crisis of that year, when a terms of trade shock precipitated a rapid currency depreciation, convinced many that the resumption of sustained growth would be possible only when structural rigidities in the economy were eliminated. Major initiatives included:

- a general program of tariff reform with the aim of reducing tariff rates to 5 per cent;
- the Tax Summit, which led to reform of company tax and reductions in top marginal income tax rates;
- corporatisation of most government business enterprises;
- privatisation of government business enterprises including Qantas, the Commonwealth Bank, Aussat, and the Commonwealth Serum Laboratories;
- abolition of the Two-Airlines agreement;
- introduction of competition in telecommunications;
- general policies of competitive tendering and contracting;
- abandonment of centralised wage fixing in favour of enterprise bargaining; and
- National Competition Policy, embodied in the *Competition Policy Reform Act 1995* (Commonwealth).

In general, the Howard government has continued the policies of its predecessor, but has introduced relatively few new reforms. The main initiatives have been cuts in public expenditure, the *Workplace Relations Act*

*1997* and increased support for private provision of school and university education. Although the government claimed that these measures demonstrated a commitment to microeconomic reform, they may also be interpreted simply as class-based measures, rewarding traditional supporters and attacking traditional opponents. In the area of tariff policy, the government has slowed the pace of reform, permitting the maintenance of relatively high levels of protection for the motor vehicle and textile, clothing and footwear industries.

The set of microeconomic reforms undertaken since 1973 is extensive. Nonetheless, some advocates of microeconomic reform have argued that reforms undertaken thus far have merely ‘scratched the surface’ of necessary changes. Although the retreat of government over the past twenty-five years has been striking in qualitative terms, the quantitative change in the ratio of government expenditure and taxation to total output has been much less dramatic.

This is primarily because the trends which led to expansion of the public sector over the postwar period have continued. Demand for services such as health and education, traditionally provided by governments, have grown. Demographic changes, reinforced by high unemployment, have increased the demand for transfer payments. Thus, in the absence of some transfer of activities from the private to the public sector, growth in the public sector share of GDP would have continued, and perhaps accelerated. The question of whether substantial further extension of reform is feasible will not, however, be addressed in the present paper. Rather, the focus will be on the lessons of the reforms undertaken over the past twenty-five years.

## 4.3 Neoclassical growth theory and ‘new growth theory’

Analysis of an extensive set of reforms undertaken over a long period is best undertaken within the framework of a model of economic growth. Most recent discussion of growth theory is based either on the neoclassical growth model developed by Solow (1956) and Swan (1956), or on more recent ‘new growth theory’ models incorporating increasing returns to scale.

The neoclassical growth model is based on an aggregate production function, which may be conveniently expressed in the logarithmic form

$$\log Y_{it} = T_t + A_{it} + \alpha \log(L_{it}) + (1-\alpha)\log(K_{it}) + \varepsilon_{it} \qquad (4.1)$$

where $Y_{it}$ is output in country $i$ at time $t$, $L_{it}$ is the quality-adjusted labour input in country $i$ at time $t$, $K_{it}$ is the capital input in country $i$ at time $t$, $A_{it}$ is the effect of policies and institutions in country *i* at time *t*, $\varepsilon_{it}$ is a stochastic shock for country *i* at time *t*, and $T_t$ is the level of technological knowledge at time *t*.

A crucial assumption is that the technological knowledge is exogenously determined and the same for all countries. Under a wide range of conditions, the neoclassical growth model gives rise to two critical results:

- the long-run rate of growth in income per capita is the same for all countries and is equal to the exogenous rate of increase of *T*; and
- for any two countries *i* and *j* with $A_{it} = A_{jt}$, the income levels $Y_{it}$ and $Y_{jt}$ will converge over time. [1]

Much of the early work on the neoclassical growth model focused on savings and investment, which determined the rate of growth of *K*. Analysis of (4.1) shows that an increase in the investment rate will lead initially to faster economic growth. Eventually the capital stock, and the level of output will reach a new equilibrium level where the ratio of net investment to GDP stabilises. The growth rate of GDP will then return to the initial level, determined by population growth and exogenously determined technological change.

This analysis was undertaken on the assumption that international capital flows were small enough to be ignored. However, the key results are strengthened in the case of free international capital flows. In this case, the process of convergence in national productivity levels will be more rapid and, assuming common technology, all nations will have the same level of capital intensity. Countries with higher (lower) savings rates will be net lenders (borrowers). Assuming no country-specific effects, there will be no difference in national output per capita between countries with high and low savings rates. However, lender countries will have higher national income per capita since their citizens will receive returns from their overseas investments.[2]

More recently, new growth theory models have sought to relax the assumption that technology is exogenously determined. The critical idea is that the production of knowledge is characterised by increasing returns to scale because

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1 Assuming the error processes $\varepsilon$ are stationary and the variables in the right-hand side of (4.1) are integrated of order one, the convergence hypothesis may be restated as saying that the per capita income series $log(Y/N)$ share a cointegrating vector, which may be interpreted as the common long-run rate of growth of technological knowledge

2 As the Australian debate over the current account deficit, and particularly the contributions of Pitchford (1992) show, there is no obvious reason why aggregate saving should be a variable of interest to policymakers in this context. In a world of perfect capital markets, saving and borrowing decisions are matters of individual preference.

of the public good characteristics of information. Hence, long-term growth arises endogenously rather than being driven by exogenous technological change. If, in addition, it is assumed that technology is country-specific, endogenous growth models give rise to the possibility that growth paths for different countries will diverge. However, as Barro and Sala-i-Martin (1997) observe, convergence will occur whenever copying of inventions is easier than making the invention in the first place. Thus, the prediction of convergence is not changed by the endogenisation of technology.

It is useful, therefore to turn attention to the remaining terms in equation (4.1). Differentiation of (4.1) yields the growth equation:

$$dlogY_i/dt = dT/dt + dA_i/dt + \alpha dlog\ L_i/dt + (1-\alpha)\ dlog\ K_i/dt + d\varepsilon_i/dt. \tag{4.2}$$

Typical data sets include measures of output and capital stock, and the labour force, not adjusted for quality which will be denoted $N_{it}$. A regression of output against capital and the labour force, with the restrictions implied by constant returns to scale yields an estimate of $\alpha$ and an $R^2$ value representing the proportion of observed variance in growth rates explained by changes in the labour force and the capital stock. What remains is the 'Solow residual':

$$\Delta = dT/dt + dA_i/dt + \alpha(dlog\ L_i/dt - dlog\ N_i/dt) + d\varepsilon_i/dt \tag{4.3}$$

Changes in the labour force arising from population growth are of little interest if we are concerned with growth in income per capita. Hence, analysis of $L$ should focus on the possibility of improving the quality of labour input, primarily through education. The development of human capital theory shows that, in principle, analysis of $L$ can be undertaken in the same fashion as analysis of $K$. However, as the debate over new growth theory shows, the assumption of diminishing marginal returns may not be applicable in this case. Particularly, if it is assumed that research and education are complementary processes, growth may be interpreted primarily in terms of augmentation of $L$. That is, rather than being viewed as something 'out there', technological knowledge may be regarded as being embodied in the individuals who possess that knowledge.

The rhetoric of the 'clever country' suggested an implicit analysis of this kind. However, recent Australian government policy has been actively hostile to the education sector, with cuts in funding reflected in declining rates of school completion and falling demand for higher education. Although this is a topic that obviously requires further analysis, attention in this paper will be focused on the policies of microeconomic reform that have been pursued by Australian governments over the past twenty-five years.

Hence, attention may be focused on the term $A_{it}$, which represents the impact of political and social policies and institutions. Policies and institutions, such as markets and governments, do not contribute directly to production. However, they may help, or hinder, productive activity. In particular, when the conditions of the first and second fundamental theorems of welfare economics are satisfied, a combination of freely functioning competitive markets and lump-sum *ex ante* redistribution will yield a socially optimal outcome.

When transaction costs prevent the emergence of some markets but governments can costlessly implement policies, and political processes work smoothly, a socially optimal outcome can be obtained through appropriately designed government intervention. In the more realistic setting where neither markets nor governments are perfect, no first-best outcome can be obtained, but institutions and policies move the economy closer to, or further away from a socially optimal allocation of resources.

This view of institutions may be modelled through the use of frontier production functions (Aigner, Lovell and Schmidt 1977). In this approach, the term *A* takes non-positive values, with production on the frontier represented by zero values, and production inside the frontier represented by negative values. The proportional distance from the frontier is given by $1–exp(A)$. Starting from a given negative value of A, improvements in policy can be modelled as moving *A* closer to zero.

In the microeconomic reform debate, it has been common to refer to the frontier as 'world best practice', and to assume that, in the absence of government intervention, competition will, in most industries, ensure the achievement of world best practice. This is equivalent to an assumption that market failures are rare and easily corrected. In particular, the market failure associated with recessions and other macroeconomic shocks are largely ignored.

A number of practical difficulties must be noted here. In particular, the task of estimating (4.1) so as to distinguish between the effects of social and institutional factors, represented by *A*, and random shocks, represented by $\varepsilon$, poses significant econometric difficulties, whether a standard regression approach or a non-parametric approach such as data envelopment analysis is employed. Further problems arise where partial productivity measures, such as the ratio of output to labour are compared without taking account of differences in factor intensities.

Quiggin (1997) discusses some of these difficulties, and shows that a simple benchmarking approach, based on the identification of the best performing country or firm in a sample as the 'world best practice' benchmark will always lead to over estimation of the potential benefits of reform. Simple benchmarking exercises, or informal approximations to such exercises have been used in most Australian studies of the benefits of microeconomic reform.

Equation (4.3) shows that, other things being equal, growth rates will be higher in countries where $A$ is increasing. However, since $A$ is bounded above by zero, increases in $A$ cannot continue indefinitely. Thus, both classical and 'new growth' models imply that, once the phase of catch-up growth is complete for a given country, it is impossible for that country to maintain growth rates consistently higher than those of the group of developed countries.

On the other hand, A is unbounded below. That is, it is easier to destroy than to build up, and it is possible, with sufficiently bad government and social institutions for a country to fall consistently behind the leading group. The example of Argentina, which was among the world's wealthiest countries at the turn of the century, shows that this possibility is a real one.[3] However, the Argentinian example is unique. The second-worst performer is New Zealand which was near the top of the world 'league table' in 1950, but now has an income level about 30 per cent below that of the leading OECD countries, with about half of this relative decline occurring since 1985. However, most forecasts of future economic performance in New Zealand suggest that growth will be equal to, or perhaps slightly above, the OECD average (Easton 1998). In fact, New Zealand's relative decline may be interpreted as the result of a sequence of negative shocks to A, after each of which growth at the OECD average rate was resumed (Easton 1996).

Once countries have joined the developed group, they hardly ever leave it. Furthermore, the variation in levels of income per capita within the group of developed countries is small. New Zealand, currently 19th on the usual 'league table', has income per capita about 30 per cent less than that of the leading country — the United States. The five OECD countries poorer than New Zealand (Spain, Ireland, Portugal, Greece and Turkey) are still in the catch-up phase. Adjustments to the United States figure to take account of the relatively inefficient United States health sector and the economic impact of high crime rates would reduce the variance within the group of developed countries even further.

A number of observations may be made regarding the relatively small variation in income levels observed within the group of developed countries. First, low variance is consistent with microeconomic analyses suggesting that economic distortions, such as tariffs, monopolies and distorting taxes, reduce income by

[3] Argentina's decline is exaggerated because national accounting estimates tend to overstate income for frontier economies such as that of Argentina in the 19th century. As is discussed below, this point is also relevant in evaluating Australia's long-term economic performance.

only a few percentage points. Large negative values of $A$ occur as a result of the absence, or breakdown, of the rule of law (as occurred in Argentina from the Peronist period onwards), and not because of mistakes in industry assistance or tax policy.

Second, because policy ideas are internationally mobile, movements in $A$ tend to be correlated across countries. Thus, from 1945 to 1970 the economic role of the State expanded in most countries as a result of the intellectual dominance of Keynesian and social democratic ideas. From the early 1970s onwards, free-market ideas became dominant, first in the English-speaking countries, and then more generally. With the usual lag, the role of the state began to contract. Presumably, one of these trends was associated with a movement towards the socially optimal frontier (an increase in $A$) and the other with a movement away from the frontier (a reduction in $A$).

Casual empiricism, based on a comparison of the high growth rates from 1945 to 1970 with the lower rates observed since then, would suggest that $A$ first increased, then declined. However, the hypothesis that the policy makers and advisers of today are wiser and better informed than their predecessors implies the opposite, suggesting that the improvement in policy has been more than offset by adverse technological shocks. Whichever of these interpretations is correct, parallel developments in policy imply correlations in $A$ across countries.

An important policy implication of convergence arises from the fact that income per capita for any individual country is bounded above, since no country can move far ahead of the OECD leaders as a group. Also, income gaps will tend to erode over time. It follows that the benefits of reform policies are finite in magnitude and duration. Hence, where a reform program involves a transitional period during which income falls, it is not possible to claim that the long-run benefits necessarily outweigh any short-term costs. This question must be assessed on a present value basis.

## 4.4 Dynamic gains and X-efficiency

Most estimates of the welfare costs of microeconomic distortions are small relative to national income. A common response has been to argue that these estimates are ‘static’ and that the removal of distortions will yield large, but unspecified ‘dynamic’ benefits. Although the growth model of equations (4.1) to (4.3) is dynamic, it is not immediately obvious where ‘dynamic’ benefits of reform might arise.

It is often argued that increased competition will force firms and their employees to become more efficient, by 'working smarter'. This is a variant of the X-efficiency hypothesis put forward by Liebenstein (1966). In the context of the current model, it may be argued that, in addition to the initial effect of removing allocative distortions and thereby generating once-off increases in $A$, microeconomic reform will increase competition and thereby lead, over time, to the elimination of technically inefficient firms. This will result in an upward trend in $A$, and therefore to higher rates of growth of $Y$.

These arguments are critically assessed by Quiggin (1998), drawing on Stigler's (1976) critique of X-efficiency theory. It is argued that most apparent improvements in X-efficiency arise, in reality, from increased work intensity, and therefore do not involve increases in $Y/L$.

## 4.5 Changes in the level and growth rate of national income

### 4.5.1 The objective

In considering the impact of microeconomic reform on welfare, it is necessary to define an appropriate measure of welfare. Under some simplifying assumptions to be discussed below, welfare for an individual or a group is measured by the present value of consumption. Gross domestic product (GDP) is not an appropriate basis for welfare analysis, as may be seen by considering its definition in detail.

'Gross' measures include no allowance for depreciation. Hence they always overstate income. The overstatement will be greater, the larger is the capital stock and the higher the average rate of depreciation. The use of gross rather than net measures may be justified in two ways. First, since depreciation must be imputed, gross measures are more accurate in the short term and therefore more useful in measuring short-term fluctuations in economic activity. Second, for the purposes of short-term Keynesian demand management, gross rather than net investment is relevant since it is gross investment that is a determinant of aggregate demand. Neither of these points is relevant in an assessment of the welfare impacts of long-term policies like microeconomic reform.

'Domestic' measures refer to all economic activity taking place within the country, regardless of whether the resulting income streams accrue to Australians or foreigners. For a country with net foreign liabilities, such as Australia, domestic measures will overstate income. The appropriate measures for welfare analysis are 'national' rather than 'domestic' measures.

'Product' measures are inappropriate for welfare analysis because consumption and not production is the object of economic activity. Although, under appropriate assumptions, the present value of net national product must equal the present value of consumption in the long run, the short-run paths of the two will differ unless rates of saving and investment are constant.

Finally, it is necessary to remember that national accounts refer only to the output of the business and government sectors, and do not take any account of economic activity within households. In general, an increase in labour supply to the business and government sectors must imply a reduction in leisure or in production within the household sector. It may be argued that the opportunity cost of marginal increases in labour supply is low enough to be disregarded in the case where previously unemployed workers are drawn into the labour force.

However, where increased labour supply arises from an increase in working hours or work intensity, or where both parents in a household with children are employed, the opportunity cost of labour is significant. This point is important in assessing the economic performance of countries such as Japan, where growth in output has been based, in part, on high employment levels and long working hours. When leisure is taken into account, the representative Australian worker is unambiguously better off than his or her Japanese counterpart (Dowrick and Quiggin 1993).

### 4.5.2 Levels, growth rates and present values

Estimates of the effects of policy changes are normally presented in terms of changes in the level or growth rate of the variable of interest, rather than in terms of present values. There are several reasons for this. First, most policy changes, other than investment decisions, may be interpreted either as measures yielding a sustained increase in the level of a welfare-relevant variable or as measures leading to changes in the rate of growth of output and consumption.[4] For example, the removal of an unnecessary and costly regulation yields an increase in the level of output and consumption (Figure 4.1). A policy which increases the rate at which technical innovations are adopted would lead to a sustained increase in the rate of growth of output and consumption (Figure 4.2).

In addition, the concept of present value is more complex and less familiar than that of a change in the level or growth rate of income. Hence, as a statistic summarising the results of a complex analysis for a general audience, the

[4] Occasionally, policies may yield a 'windfall' gain or loss that is not sustained. For example, the sale of assets that were previously unused yield a windfall gain, while misdirected investments yield windfall losses.

present value is not very satisfactory. Except where it is necessary to trade off initial losses against future gains, it is simpler to assess policies in terms of their effects on levels and growth rates. Nevertheless, the appropriate objective for economic policy is maximisation of the present value of consumption.

Any estimate of the effects of microeconomic reform on the level of national income may be restated in terms of effects on growth rates, and vice versa, provided a time-frame is presented. For example, a 5 per cent increase in the level of income, realised over five years, is equivalent to an increase of one percentage point in the annual rate of growth of income for that period. A policy framework that generates a continuing series of once-off improvements in levels may be reinterpreted as a single policy change generating a higher rate of growth. The increase in the rate of growth is given by the average increase in the level of output associated with policy innovations multiplied by the frequency of policy innovations associated with the given policy framework.

Figure 4.1: **Reform leading to removal of a distortion** (after Gruen 1997)

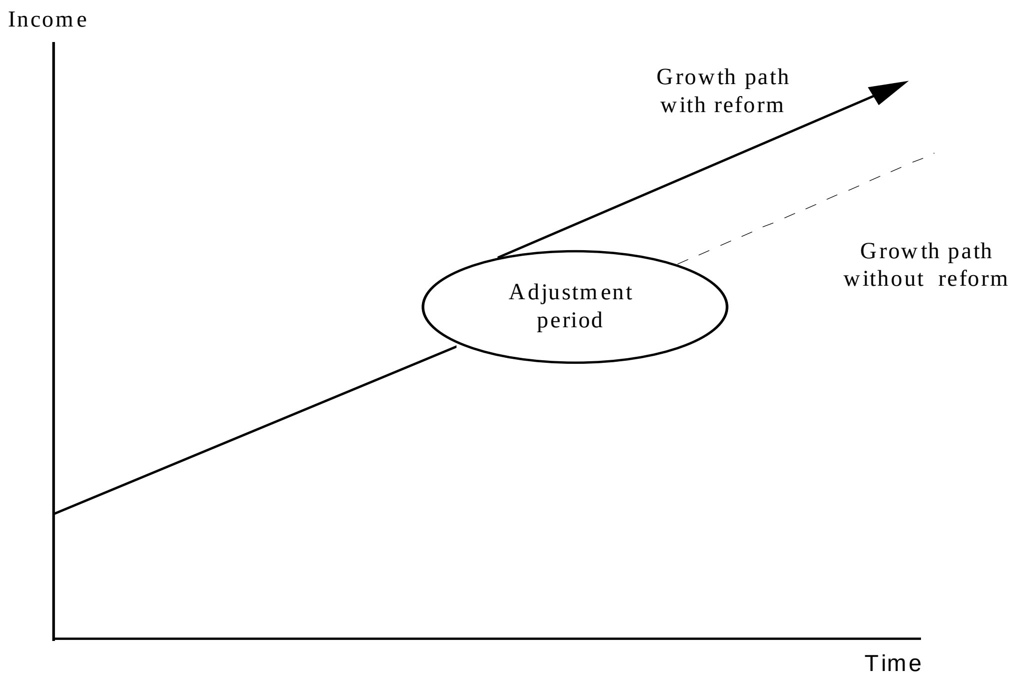
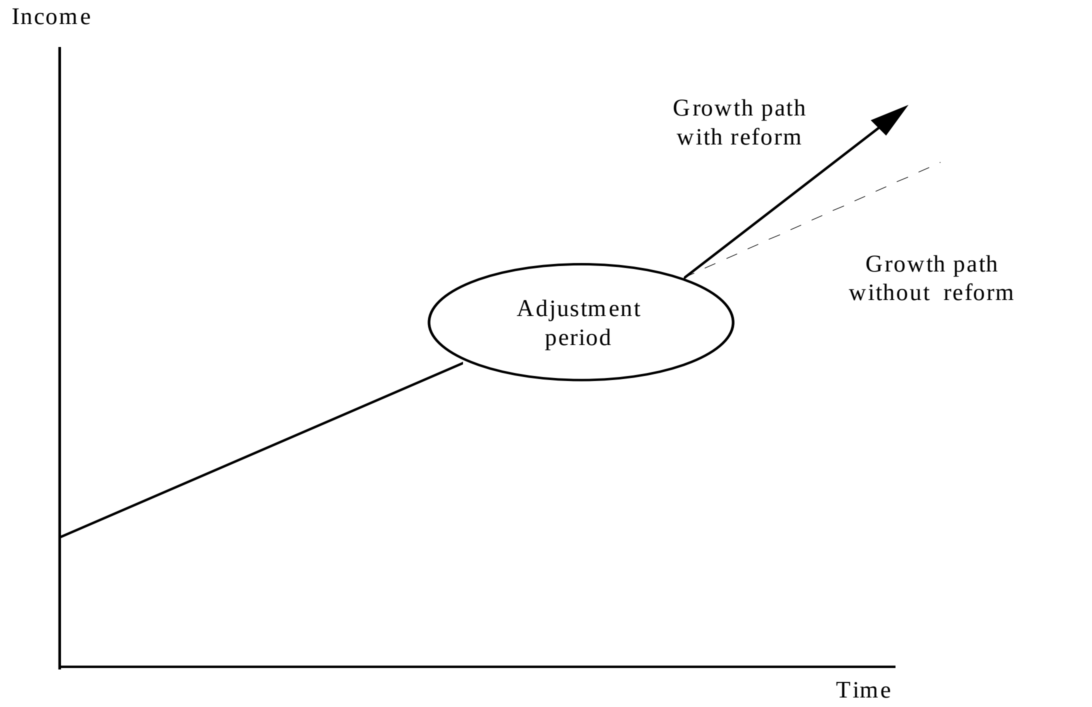


Figure 4.2: **Reform leading to an increase in technical innovation** (after Gruen 1997)



Many studies use a mixture of assumptions about effects on levels and effects on growth rates. A good example is the Industry Commission (1995) study of the effects of 'Hilmer and related reforms', in which a large number of reform policies were analysed. Two main approaches were used. Policies of competitive tendering and contracting in the public sector, and policies designed to remove restrictions on competition in the private sector were modelled as generating a once-off improvement in productivity. Reform of government business enterprises was also sometimes modelled in terms of a once-off improvement in productivity, arising from a movement to world best practice.

The time-frame over which these improvements were to be realised was unstated. For some government business enterprises, however, reform was modelled as leading to an increase in the rate of productivity growth. This was converted to a change in levels by computing the net impact over a four year period.

## 4.6 Implications for policies aimed at improving economic performance

The discussion above indicates that policies of microeconomic reform should be designed to increase the level and growth rate of national income, and, ultimately the present value of consumption. Policies that lead to higher GDP need not improve welfare, as measured by the present value of consumption. The simplest and most reliable way of increasing the level and growth rate of GDP is to increase the investment rate. However, an increase in the investment rate will not, in general, increase the present value of consumption. Investment must be financed either by increased saving, generating an initial reduction in consumption, or by borrowing from foreigners, resulting in a stream of future liabilities. If the investment rate was initially optimal, small changes in investment will have no effect on the present value of consumption. An increase in investment will be socially beneficial only if it leads to the exploitation of investment opportunities with positive net present value.

Two examples illustrating the importance of this point are Krugman's (1994) critique of the 'Asian miracle' hypothesis, based on the work of Young (1993, 1994), and Forsyth's (1992) critique of estimates of the benefits of microeconomic reform in Australia. Young (1994) estimated a classical growth model for a number of Asian countries for the period 1966 to 1990, and found that, in a number of countries including Singapore, observed growth was entirely explained by increases in inputs of physical and human capital. The 'Solow residual', which measures changes in multifactor productivity (MFP), was negative. Krugman drew the inference that there was nothing miraculous about Asian economic performance, and that predictions that the 'tiger economies' would soon overtake those of the OECD were ill-founded.

Forsyth examined the Industry Commission (1990) projection of the benefits of microeconomic reform, based on the results of ORANI modelling, which suggested that the set of reforms under consideration would increase the level of GDP by around 6.5 percentage points. Forsyth observed that of this increase, around 1.8 percentage points, was due to increased use of inputs, primarily capital, and that only the remaining 4.7 percentage points could be regarded as a benefit due to reform.

## 4.7 Estimates of the effects of reform in Australia

A variety of estimates of the benefits of microeconomic reform in Australia have been made. With the exception of Kasper *et al.* (1980) and Quiggin (1997), all are based on computable general equilibrium models and most on some variant of the ORANI model. The procedure used in the majority of cases has been one of comparative statics. A base simulation is modified to incorporate a range of static productivity shocks and price changes arising from reform along with, in some cases, a shock to the general rate of productivity growth or the employment level. Kasper *et al.* (1980) present scenarios with different growth rates based on the assumption that radical reform would permit Australia to match the growth rates observed in the best-performing Asian economies. Quiggin aggregates a series of microeconomic productivity shocks, adjusted downwards to take account of withdrawal from the labour force resulting from cuts in public sector employment.

The estimates cover different sets of reforms and different, not always explicit time-frames and are therefore not directly comparable. Nevertheless, if microeconomic reform is viewed as a continuous process over the last 25 years, the different estimates may be viewed as measures of the impact of reform on the annual rate of growth. If this effect is compounded over say, five years, the estimates may be interpreted as the effect on the level of output of the reforms introduced (or proposed) for some five year period.

This interpretation allows for the possibility that the effect of reform will be felt with a lag, provided that reform is a continuing process. Suppose, as an illustration, that reform proceeds at a steady pace, and that continuing reform raises the sustainable rate of consumption growth by 1 percentage point. Then, the reforms introduced over a given five-year period, say, 1991 to 1995, will raise the sustainable level of consumption by 5 per cent. Some benefits may be felt with a lag, so that the period over which reforms take effect might run from 1991 to 1998.

The interpretation of time lags presented here is broadly consistent with the standard presentation of ORANI-based estimates of the benefits of microeconomic reform. These estimates typically cover a range of reforms that could be introduced over a period of four or five years. The solution is described as being valid in the medium term, usually said to be between four and eight years.

A selection of estimates is presented in Table 4.1. The first column shows the estimated increase in GDP which a set of microeconomic reforms (implemented over the time frame shown in the second column) are estimated to generate, relative to a baseline of no reform. The third column shows whether the method of analysis was primarily in terms of comparative statics, postulated dynamic growth rate effects or a mixture of the two. The fourth column shows the effect on the annual rate of GDP growth implicit in the published estimate and the fifth column shows the associated change in the level of GDP over five years.

For example, Kasper *et al.* (1980) modelled reforms proposed for the period 1980–2000. Their estimates of the benefits of these reforms (which they called the 'libertarian' path) relative to a baseline of no reform (called the 'mercantilist' path) were reported in terms of effects on the annual rate of growth of GDP, which implied a 77 per cent increase in income for the reform program as a whole. To facilitate comparison with other studies, the benefit estimated to be realised over a five-year period has been computed.

Most estimates appear over-optimistic in retrospect. This is particularly evident with respect to the experience of the 1980s. *Ex ante* estimates such as those of Kasper *et al.* (1980) suggested that large gains could be achieved through the introduction of relatively modest reforms. Similar views, though not expressed in quantitative terms were put forward with respect to financial deregulation by the Campbell Committee (Campbell 1981).

Many observers during the 1980s, such as Higgins (1991), believed that gains were in fact being realised. It was widely argued that financial deregulation, and particularly the boom in company takeovers, dominated by the new 'entrepreneurs' had forced incumbent management to improve the performance of their enterprises. This view was reinforced by the strong cyclical upswing that took place from 1983 to 1989 and particularly by the successful adjustment to the terms-of-trade shocks of 1986.

### Table 4.1: **Estimates of the benefits of microeconomic reform**

| *Source* | *Estimated benefit (% of GDP)* | *Time-frame of reform* | *Method of analysis* | *Growth rate effect*[a,b] | *5-year benefit (% of GDP)* |
|---|---|---|---|---|---|
| Kasper *et al.* (1980) | 77.0 | 1980–2000 | Dynamic | 2.8 | 15.3 |
| IAC (1989) | 4.7 | 1990–1995 | Static | 0.9 | 4.7 |
| IC (1990) | 6.5 | 1990–1995 | Static | 1.3 | 6.5 |
| BIE (1990) | 21.7 | 1990–2000 | Mixed | 2.0 | 10.3 |
| Business Council of Australia (1994) | 21.2 | 1995–2010 | Mixed | 1.3 | 6.6 |
| Filmer and Dao (1994) | 12.7 | 1990–1995 | Mixed | 2.4 | 12.7 |
| Dao and Jowett (1994) | 13.0 | 1990–1995 | Mixed | 2.5 | 13.0 |
| IC (1995) | 5.5 | 1995–2000 | Static | 1.1 | 5.5 |
| Quiggin (low) | 0.7 | 1995–2000 | Static | 0.1 | 0.7 |
| Quiggin (high) | 1.1 | 1995–2000 | Mixed | 0.2 | 1.1 |

a Dynamic and static.
b Change in the growth rate of GDP (percentage points).

The initial reaction to estimates such as those of Dowrick (1990) showing hardly any improvement in private sector productivity over the decade was one of disbelief. The issue was clouded by disagreement over the appropriate treatment of the financial sector and other technical issues. Nevertheless, once the recession of 1990–91 permitted appropriate cyclically adjusted comparisons, it became evident that the productivity performance of the 1980s was worse than that of the 1970s, a decade which, at the time, had been viewed as one of economic disaster.

The experience of the 1990s seems somewhat more favourable. The Industry Commission (1997) estimates that the rate of multifactor productivity growth in the market sector has risen from 1.5 per cent, the average rate since the 1960s to a trend rate of 2.0 per cent in 1994–95 and 1995–96. Some, but not all, of this increase is acknowledged to be cyclical. Since the market sector accounts for about 60 per cent of GDP, a productivity improvement of 0.5 percentage points is equivalent to an increase of 0.3 per cent in the trend rate of GDP growth.[5]

[5] Neither the *ex ante* estimates presented by the Industry Commission (1995) and Quiggin (1997), nor the *ex post* estimates of the Industry Commission (1997) take account of changes in productivity growth in the nonmarket sector.

Over a five-year period, this yields a net gain equal to 1.5 per cent of GDP, slightly higher than the upper bound estimate presented by Quiggin (1997), but well below any of the other estimates mentioned above, even allowing for ambiguity in the time-frame.

If some of the extra growth is assumed to be cyclical and some to represent a recovery from the below-trend productivity of the 1980s, with the remainder being attributed to microeconomic reform, the evidence reported by the Industry Commission (1997) is consistent with the estimates of benefits presented by Quiggin (1997), namely, a net improvement in GDP of between 0.7 and 1 per cent of GDP over five years.

Another noteworthy point is that estimates incorporating changes in growth rates directly are generally higher, and therefore more inaccurate, than estimates based on changes in levels.

## 4.8 Concluding comments

Growth theory provides a framework within which the effects of microeconomic reform and other policy changes can be assessed. In particular, it is important to note that a developed country like Australia cannot consistently outgrow the other developed countries as a group. It seems unlikely, under any conceivable policies that Australia could maintain a level of income per capita more than 10 per cent higher than that of the leading OECD countries.

Since per capita income in Australia is currently about 20 per cent below the United States level, this implies that the most microeconomic reform, or any other policy program, could do is raise income per capita by 30 per cent, in addition to an underlying growth rate equal to the OECD average. Hence, growth theory yields an upper bound of 30 per cent for estimates of the benefits of reform, microeconomic or otherwise.

Of the published estimates of the benefits of microeconomic reform in Australia, only that of Kasper *et al.* (1980) violates this bound. However, if estimates such as those of the Bureau of Industry Economics (1990) are extrapolated over the thirty year time-frame that seems likely to be required for comprehensive microeconomic reform, the bound becomes tight. The estimates of Business Council of Australia (1994) are explicitly predicated on the assumption that microeconomic reform would raise Australian per capita incomes to the level of the leading OECD countries, which would require an increase of 20 per cent.

The available evidence suggests that the benefits of microeconomic reform have been, and are likely to remain, much smaller than 20 per cent of GDP. There is no evidence of positive net benefits over the twenty years to 1993. Current productivity data suggests a possible increase in the annual growth rates of 0.3 percentage points, at which rate it would take 100 years to attain the upper bound implied by growth theory. Of course, an additional 0.3 percentage points of annual income growth is well worth having. Over ten years this would imply the achievement of a level of income 3 per cent, or $15 billion per year, higher than in the absence of reform. Assuming about 40 per cent of this benefit accrued to the government, the benefit would be sufficient to restore the public spending programs cut in the 1997 and 1998 Budgets or to finance a reduction of one to two cents in all marginal tax rates.

Nevertheless, given the limited payoff from microeconomic reform so far, other methods of increasing the level and growth rate of national income should be given higher priority than has been the case in the recent past. The most obvious are improvements in the quality and quantity of education and a reduction in the waste of human capital associated with unemployment.

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## **Discussant** — *Graeme Wells*

John Quiggin's interesting paper covers a broad range of issues. This comment provides a perspective on the interaction between microeconomic reform, productivity growth and macroeconomic outcomes. I will focus on the interpretation of results of the kind reported in his Table 4.1.

It is well known that there is no straightforward linkage between GDP and welfare measures. It is possible for welfare-enhancing reforms to increase measured GDP, to leave GDP unchanged, or to reduce it. Consider for example a single-good economy in which a tax reform lowers the marginal tax rate on labour income. If income and substitution effects in labour supply are equal and opposite there would be no change in labour supply and from a partial point of view, no change in output. But the substitution effect implies a welfare gain. To take another example, suppose a government-produced service is privatised and that as a consequence labour productivity in this activity rises. Since the contribution of public sector output to GDP is measured at cost, it is quite possible that measured GDP could fall even though privatisation leads to an improvement in efficiency.

In a multisectoral economy, sector-specific productivity change is also likely to lead to relative price changes and a reallocation of resources across sectors. As McKibbin (1994) has argued, the resulting impact on aggregate GDP is not necessarily well-represented by an aggregate analysis in terms of the average of sector-specific productivity shocks across the whole economy.

From this perspective the common practice (reflected in Quiggin's Table 4.1) of expressing economy-wide welfare gains as a percentage of initial GDP is potentially misleading. The temptation is to infer (ii) from (i), where the statements are respectively:

(i) 'the estimated benefit of microeconomic reform is x per cent of GDP'; and

(ii) 'the expected effect of microeconomic reform is to increase measured GDP by x per cent',

and, having made this inference, to look for evidence of microeconomic reform in terms of higher GDP and/or multifactor productivity.

With that important caveat in mind, suppose that an observer of the Australian economy believed that microeconomic reforms *had* led to an increase in measured aggregate multifactor productivity. What would the longer-run macroeconomic effects be? To answer this question it is clear that the focus of attention in a small open economy should be on output rather than income — changes in productivity impact on output, while it is savings decisions which determine the net foreign asset position and hence the relationship of income to output.

In principle, it is also important to distinguish between ‘level effects’ and ‘growth rate effects’ where, as in Figures 4.1 and 4.2, the former refers to a one-off increase in productivity, while the latter refers to a sustained change in its growth rate. But, like Quiggin, we will assume that because the reform process is drawn out over time, growth rate effects at the economy-wide level are observationally equivalent to a sequence of level effects.

## Changes in productivity growth in a ’demo’ model

Now consider the effects of a sustained increase in productivity growth in a Solow-Swan model of a small open economy. For expository purposes, it is useful to begin with a simple one-sector real model based on perfect international capital mobility, no adjustment costs for capital, a constant saving rate and an exogenous labour supply[6]. Technology is Cobb-Douglas, and initially the economy is in steady state with no net foreign assets. The rate of labour force growth is 1 per cent per annum and the rate of Harrod-neutral technical change is 1.3 per cent per annum. Some effects of a permanent increase in the rate of productivity growth, to 2.7 per cent per annum, are illustrated in Figure 4.D1. In the absence of adjustment costs, the domestic capital stock is expanded immediately, leading to an immediate jump in the output growth rate to its steady state level of about 3.7 per cent per annum, a current account deficit and an accumulation of foreign debt. A consequence of the latter is that the growth of income lags the growth of output, although these growth rates are equalised in the new steady state.

Before relying on a simple model of this kind to draw inferences about the actual time path of the Australian economy, one would need to take into account factors which might mask the effects of productivity growth. A favourite in popular Australian commentary is the decline in the saving ratio illustrated in Figure 4.D2. If we allow for mis-measurement of the saving ratio in the 1970s because of unanticipated inflation, the long-run saving ratio has fallen from around 10 per cent in the period up to the early 1980s, to around 6 per cent in the 1990s.

6 A more complete analysis of this model, which is used for undergraduate teaching, is provided in Benge and Wells(1998).

Figure 4.D1: **Productivity shock: effect on output and productivity growth, demo model** (per cent per annum)

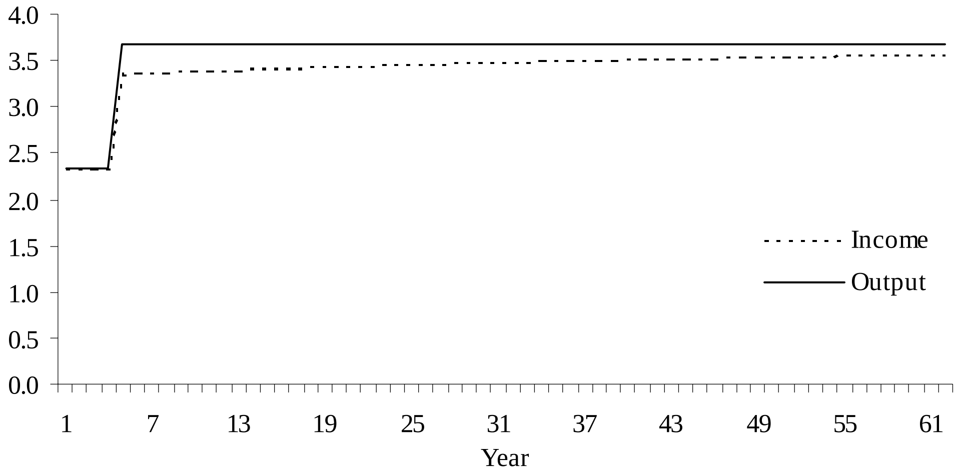
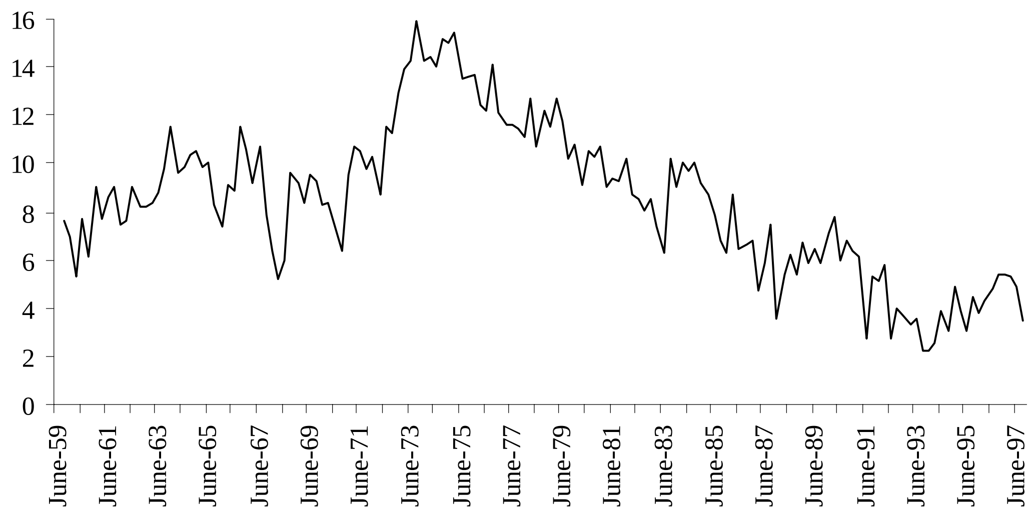


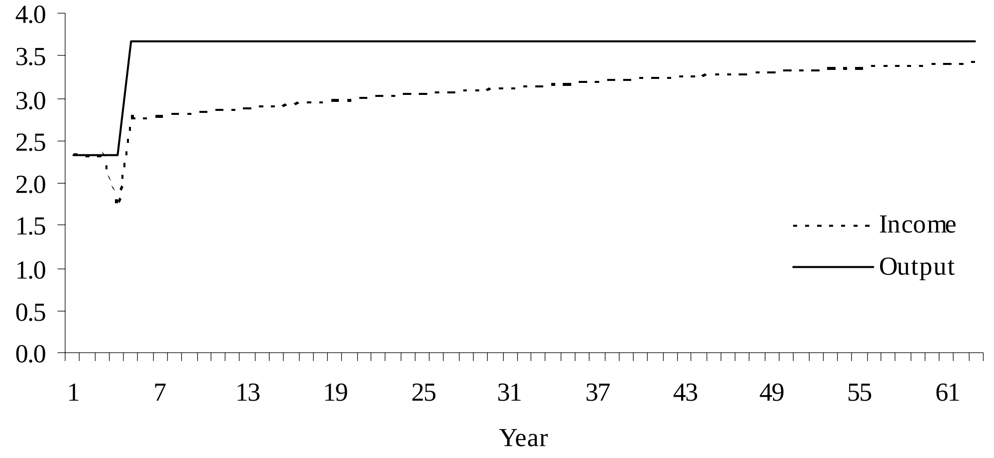

Figure 4.D2: **Household savings ratio, June 1959 to June 1997** (per cent of household disposable income)




*Source*: dX spreadsheet, ANUSTATS, 24-Feb-1998.

In our demo model, the incremental effects of a 40 per cent fall in the saving ratio are illustrated in Figure 4.D3. Because of perfect capital mobility the track of output growth is the same as before. The lower saving ratio shows up in the initial fall in income consequent on the larger current account deficit. So in this model, a fall in the saving rate has no effect on our ability to infer the effects of reform-induced productivity growth on output growth.

Figure 4.D3: **Productivity and saving shock: effect on output and income growth, demo model** (per cent per annum)




Another example[7] of a change which might mask the effects of microeconomic reform on productivity growth is the Accord of the 1980s which, some have argued, could be viewed as a constraint on real wages leading to a movement down the (shifting) labour demand curve yielding higher employment and lower productivity growth than would otherwise have been the case. While this distinction may be useful for some purposes, it is irrelevant in this demo model. What matters for output is the supply of effective labour and in the Cobb-Douglas technology used here, a rise in the growth rate of Harrod-neutral technical change is equivalent to a rise in the growth rate of employment. So, although the effects of microeconomic reform may have been captured in terms of increased employment rather than in higher productivity growth, the track of output growth would be the same as in Figure 4.D1.

## Changes in productivity growth in a 'Murphy' model

The demo model suggests that the output and income gains from a rise in the rate of productivity growth should be realised fairly quickly. It might be wondered if this general conclusion also applies in more elaborate versions of

7 A further example would be a change in the world real interest rate.

an open-economy Solow-Swan model, and for that purpose we turn to simulations of the New Zealand Murphy (NZM) model of the New Zealand Treasury, details of which are provided in Econtech (1995). In its basic structure, NZM is very similar to the MM2 model of Australia described in Powell and Murphy (1995).[8] It is a small model with 14 stochastic equations, and includes many of the features identified as being important in the survey of the previous section. It is an open-economy with full stock equilibrium as the steady state to which transitional paths converge. It has a nested CES/CET production structure in which, on the input side, primary factors of physical capital and labour are combined with an imported intermediate good to produce, on the output side, a domestic good and a rural export good. Unlike the basic Solow-Swan model, it incorporates both nominal and real rigidities. The main element of the former is the determination of money wages via an inflation-augmented Phillips curve; for the latter the form of the investment equations implies sluggish adjustment of the capital stock even though there is perfect capital mobility.

Consumption behaviour also incorporates rigidities. Government consumption is set exogenously. Although private consumption is based on an Ando-Modigliani framework, consumers (who treat government bonds as part of wealth) are backward looking in terms of their valuation of wealth — for example, human capital is proxied by current labour income. NZM embodies perfect foresight in financial markets: uncovered interest parity, the expectations theory of the term structure and a rationally expected inflation rate provide the determinants of real and nominal interest rates in the model. Perfect foresight also plays a role via the expected rate of inflation in the Phillips curve.

Like MM2, the model is closed with respect to monetary and fiscal policy by means of policy rules, which take the form of either feedback or optimal control rules. In the case of feedback rules, monetary policy is set by adjusting the slope of the yield curve (by changes to the short-run interest rate) so as to achieve an intermediate target of nominal GNE which is, in turn, consistent with the ultimate target of an annual CPI inflation rate of 1 per cent. The fiscal feedback rule changes the tax rate on labour income so as to achieve long-run convergence to a desired ratio of government debt to target GNE. Under optimal control, these instruments are set to minimise a discounted cost function which penalises excessive instrument adjustment as well as departures from desired values of inflation, unemployment, and the public debt ratio.

The shock we consider is of an unanticipated and permanent increase in the rate of Harrod-neutral technical progress, from 0.33 per cent per quarter to

8 This section draws on Bourdôt *et al.* (1996).

0.63 per cent per quarter. The target rate of nominal GNE is increased commensurately so as to be consistent with 1 per cent annual inflation along the new steady state path for real GDP. A permanent increase in productivity growth facilitates comparison with the stylised example illustrated in Figure 4.D1. Since the exogenous rate of population growth is 0.33 per cent per quarter, and the model has an exogenous NAIRU, the effect of this shock is to increase the steady-state growth rate from 0.66 per cent per quarter to 0.96 per cent per quarter.

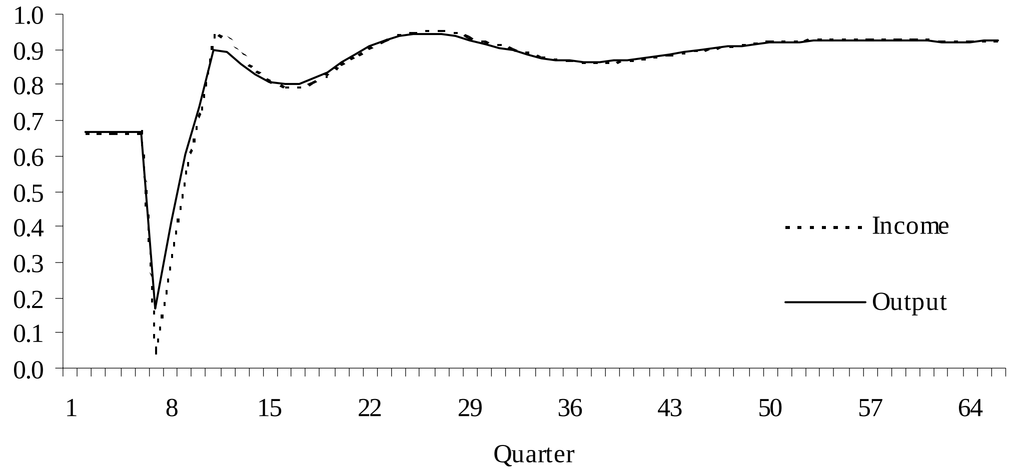
The resulting path for output growth, where monetary and fiscal policy are set by feedback rules, is illustrated by the solid line in Figure 4.D4. Perfect foresight in financial markets ensures that asset prices jump immediately in response to shocks. As in the demo model, the higher rate of productivity growth implies higher capital inflow throughout the transition. So in steady state, net exports must be higher to service the larger foreign debt — in the long run, a fall in the exchange rate is required. Instantaneously, however, there is an appreciation of the exchange rate and together with uncovered interest parity this combination of short-run appreciation and long-run depreciation implies that domestic interest rates are higher than foreign rates throughout the transition. The short-run appreciation also implies a cut in exports and hence the fall in real GDP which is shown in Figure 4.D4.

As in the simple model of the previous section, we also consider the effects on output growth of a change in saving behaviour, and the dotted line in Figure 4.D4 shows the effects of a 2 per cent increase in the intercept of the consumption function in NZM. Unlike the demo model simulation illustrated in Figure 4.D3, the change in consumption behaviour has some effect on the growth rate of output but the effect is very small — after approximately 8 quarters the track of the growth rate is very similar in the two cases.

## Conclusion

The focus of this comment is on the effects of economy-wide productivity changes on output growth. In this context, the main message of small open economy models is that if there were a substantial change in the rate of technical progress, we would expect to observe a change in the rate of GDP growth, and fairly soon.

Figure 4.D4: **Productivity and saving shock: effect on output and income growth, NZM model**[a] (per cent per quarter)




a The NZM model is a quarterly model. The time period of this analysis therefore covers 8 years.
*Source*: NZM model simulation.

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## **Discussant** — *Dean Parham*

One of the features of John Quiggin's paper is the framework he sets up to analyse the static and dynamic effects of microeconomic reform on growth. And there are also several specific points in his paper with which I agree.

But I want to focus on the way Quiggin applies his framework and the broad messages that he draws. That is, where I find I have some disagreement.

Quiggin seems to be saying three main things:

- there has been a lot of reform introduced over a long period of time;
- the gains from reform are not high; and
- therefore the policy priority on microeconomic reform is misplaced.

I want to address each of these points in turn and argue that these conclusions are somewhat hasty.

### The history of reform

First, Quiggin presents a view that there has been substantial and continuous reform since the early 1970s.

Last month, the Commission released a compendium listing of reforms that have been introduced since the 1970s (IC 1998). A feature of this history is that, while there were important reforms up to the mid 1980s, they tended to be sporadic and somewhat isolated. It was not until the latter part of the 1980s that reform gathered momentum in terms of coverage and intensity to have widespread and significant impacts. There was the across-the-board tariff reform which led to pressures for reform in other areas — infrastructure reform, the start of labour market reform and the start of competition policy reforms.

So if we are looking for the impacts of reform at *a broad level*, we should start looking largely to the late 1980s and beyond.

### The size of the gains from reform

The second point was that the gains from microeconomic reform are not large. Quiggin makes some in-principle and empirical observations on this point.

Quiggin says in the paper that the benefits of reforms are finite in magnitude and duration and so the long-run benefits will not necessarily outweigh any short term costs. If I have understood the argument, this is based on the assertion that the effects of policies — captured in his *A* term — are bounded by international convergence.

I think this is one area that needs further examination.

At least in terms of convergence of productivity levels, I would make the following observations. First, it is by no means clear that Australia's productivity performance, in general, is yet pushing up against some international frontier. Second, it is not clear that the international frontier is static. Changes in technologies, ideas, policies and practices mean that there is constant change. Third, it is not clear that other countries' standards necessarily establish a boundary on performance in all areas. The empirical literature is now showing a breakdown in the straightforward convergence process that characterised the post-war period in which the United States was the productivity leader. The variance in productivity levels between countries is increasing within some industries, as different countries specialise and assume the mantle of productivity leader in particular areas.

So it is not clear that Australia has approached a set international bound which would produce diminishing returns from further reform effort.

Quiggin also considers the dynamic effects of reform to be small. As he said in his presentation, he did not concentrate much on the dynamic effects. While his framework allows for them he says, '... it is not immediately obvious where 'dynamic' benefits of reform might arise' (Section 4.4).

Again, I think this view requires more attention.

The literature on the determinants of productivity growth emphasises the knowledge accumulation theme of new growth theory — investment in physical and human capital, infrastructure (with some controversy) and research and development.

The empirical literature also points to the importance of openness, trade orientation and competition as factors driving productivity growth.[9] I think the importance of openness and competition in explaining productivity growth opens quite a challenge to Quiggin's view that reform has little dynamic and therefore overall effect.

In this morning's sessions, we started to talk about what some of the dynamic mechanisms and effects might be — the things that stimulate productivity improvements over time. Cliff Walsh intervened on the effect of competition

[9] See, for example, Dowrick (1995), Dollar and Wolff (1993), Pilat (1996), Englander and Gurney (1994), as well as the paper by Chand, McCalman and Gretton in this volume.

on innovation and entrepreneurial activity. John Freebairn pointed out dynamic mechanisms.

I could list some other specific mechanisms that come in to play through greater openness and increased domestic and international competition:

- importation of machinery and materials that embody technological advances;
- transfer of knowledge through foreign direct investment;
- access to export markets that may, for some countries, assist specialisation and the capture of scale economies;
- the entry and exit of firms;
- incentives to adopt available technologies and more efficient management and work practices;
- incentives to develop new technologies, products and practices;
- introduction of work practices that enable the speedier introduction of new technologies;
- reductions in rent-seeking behaviour;
- greater responsiveness to consumer needs and changed market circumstances so that firms can adapt more quickly and with less waste; and
- so on.

It is not difficult to draw links between microeconomic reforms and these specific mechanisms or greater openness and domestic and international competition more generally.

But reform is not confined in its operation to openness and competition. Reform can also be linked to the other major determinants of productivity improvement — investment in physical and human capital, infrastructure and R&D. For example:

- reforms (eg to the tax system) can influence the mix of investment, especially in removing any distortions in returns between ‘productivity-enhancing’ and ‘other’ investments;
- a range of reforms could raise capital productivity which may induce further investment;
- reforms (eg subsidies and government provision) can address market failures in R&D; and
- reforms can improve the delivery of human and economic infrastructure.

What we are saying at this conference is that we need to understand more about these kinds of mechanism. And I feel sure that if full consideration were given to them all, it would establish quite a strong ‘dynamic’ dimension to the effects of reform.

Quiggin also interprets some of the available empirical evidence to support his view that the gains are small. A lot of it is concentrated on the general equilibrium modelling of gains, but I am not going to go into those here. Quiggin has issued some fair warnings in the past, but a number of issues of contention remain. And it would be too distracting to go into those here.

Let me indulge in some casual observations about Australia’s recent productivity performance and take issue with Quiggin’s interpretation.

Figure 4.D5 shows the year-to-year change in Australia’s trend multifactor productivity series as measured by the Australian Bureau of Statistics (ABS). It approximates an underlying rate of productivity growth. It shows:

- the relatively high rate of productivity growth in the 1960s and 1970s, associated with a ‘golden age’ of productivity growth — a feature common to most developed countries;
- a slowdown in the rate of productivity growth through the 1980s which again was common to most countries and was to be expected (all other things equal), as the post-war development phase ran its course; and
- a marked improvement in the 1990s which has shown considerable momentum, even allowing for any effects of the early 1990s recession.

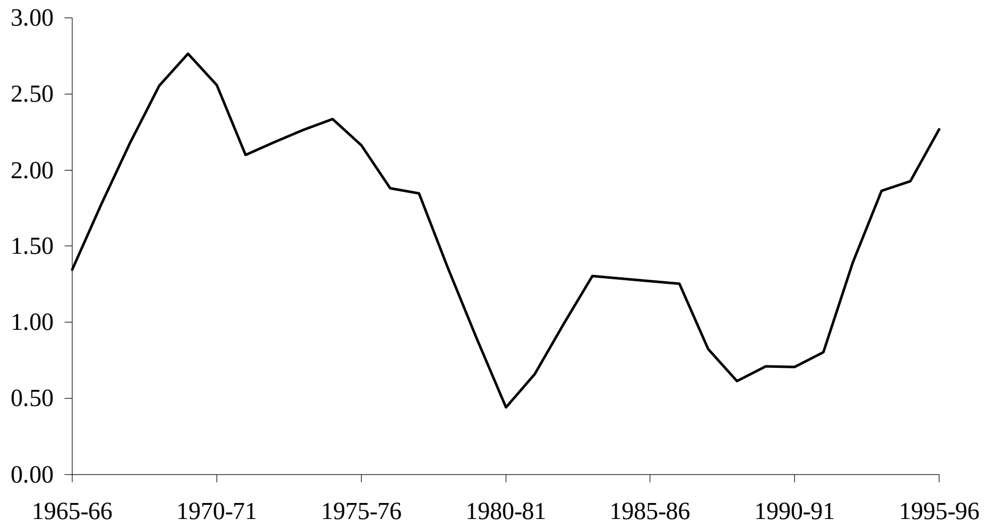
The extent to which Australia’s rate of productivity growth has improved can be characterised in several ways. Without going into detail a possible range for the improvement in the rate of productivity growth is 0.5 to 1.5 percentage points a year.[10] Quiggin chooses the low end of that range at 0.5. I would take somewhere in the middle — around 0.8.

As Quiggin has noted, an improvement of this order — even at the low end — is quite major in comparison with our long term productivity growth rate of 1.5 per cent a year. And as Quiggin also notes, the payoffs from seemingly small changes add up over a period of time.

[10] Amongst a number of possibilities, the historical base could be taken as the late 1980s trend rate of increase (0.8 per cent a year) or the long-term historical average over 1964–65 to 1995–96 (1.5 per cent a year). The current rate of growth could be taken from the growth in the actual series over the last two years (2 per cent) or the latest available yearly increase in the trend series (2.3 per cent).

But Quiggin then reduces his 0.5 number by 40 per cent because the ABS productivity numbers only cover the market sector. That is tantamount to assuming that productivity growth in the non-market sector is zero — despite the advance of technology and reforms in areas such as financial and business services and public administration.

Figure 4.D5: **Annual change in trend multifactor productivity, 1964–65 to 1995–96** (per cent)




*Source*: Calculated from ABS Cat. No. 5234.0.

However, not all of the effects of reforms would be reflected in the published ABS market-sector productivity numbers:

- not all possible reforms have been introduced;
- as was said this morning, the impacts are felt over time and perhaps over a considerable time in some cases and are unlikely to be fully reflected to date; and
- as I have just said, reforms in the non-market sector are excluded.

These factors would tend to suggest an uplifting rather than a downgrading of the observed improvements in the published productivity estimates as an indicator of the effects of reform.

Finally, I should make it clear that I do not claim that all the productivity improvement is due to microeconomic reform.[11] But if microeconomic reform is not at least a substantial explanation, I would like to know what is.

## The policy priority on microeconomic reform

The final point was Quiggin's policy implication that the priority placed on microeconomic reform has been misplaced.

This is consistent with his view that there has been a long-term substantial reform effort with small and diminishing gains as we get close to an international frontier.

But I think the evidence suggests that reform has been more sporadic, at least until the late 1980s, that reforms can be a major contributor to productivity growth and that there are some encouraging signs of a sizeable payoff to date. Moreover, we do live in an ever changing world in which new frontiers and new policy challenges emerge.

John Quiggin prefers to employ 'other' methods to increase national income — such as improvements in the quality and quantity of education and a reduction in unemployment. Let me conclude by saying that these aims are not divorced from microeconomic reform. Reform is not a slavish adherence to 'slash and burn' policies as it is often characterised. And if there are other easier, more powerful policy approaches, let's have them. They can proceed in conjunction with reform. But, when the net benefits are positive, it is still worth proceeding with reform.

## References

Industry Commission 1998, *Microeconomic Reforms in Australia: A Compendium from the 1970s to 1997*, Research Paper, AGPS, Canberra.

Dollar, D. and Wolff, E. N. 1993, *Competitiveness, Convergence and International Specialisation*, MIT Press, Cambridge, MA.

[11] Quiggin also adds that some of the improvement reflects the effects of the recession and a correction for the poor performance of the 1980s. I do not think there can be much, if any, effect of the recession in the *trend* series 5 years out from the trough. On the correction for the 1980s, it would be good to know what factor or factors were at work then, but have now been reversed. Intuitively a correction, all other things equal, would take us back to around 1.5 per cent a year evident in the early 1980s and over the long term. The 2.3 per cent now evident goes beyond that.

Dowrick, S. 1995, 'Determinants of Long-Run Growth,' in P. Anderson, J. Dwyer and D. Gruen (Eds), *Productivity and Growth*, Reserve Bank of Australia, Sydney.

Englander, A. S. and Gurney, A. 1994, 'Medium-Term Determinants of OECD Productivity', *OECD Economic Studies*, **22**, pp. 49–109.

Pilat, D. 1996, 'Competition, Productivity and Efficiency', *OECD Economic Studies*, **27**, pp. 107–146.

## General discussion

The discussion covered a wide range of issues, including:

- research and development;
- education;
- the choice of counterfactual;
- the policy changes that constitute microeconomic reform;
- definitional issues; and
- the use of computable general equilibrium (CGE) models to study the effects of microeconomic reforms.

### Research and development

The importance of research and development in the process of technological change and productivity growth was emphasised, with the suggestion that the workshop should have a session devoted to this topic. An important issue is the choice between undertaking research and development in Australia and the application of technologies developed internationally. The general consensus was that Australia should free ride on international research and development wherever possible. Nevertheless, within Australia, it was accepted that according to the neoclassical growth theory, research and development should focus on areas that are specific to Australian conditions and areas of comparative advantage.

### Education

The importance of education to the process of economic growth was stressed. However, it was noted that radical changes in education policy in Australia appear so far to have had no obvious influence on productivity levels and trends. One participant asked whether this was due to the stocks of education in Australia being too small to have a significant effect, the lag between education policy changes and economy-wide outcomes being too long or complicated to detect, changes in education policy being swamped by other factors, and the increasing quantities of education being offset by decreasing quality. Quiggin responded with the view that the lags between changes in education policy and the effect upon productivity growth were so great that testing the relationship econometrically was always going to be difficult. For example, he felt that the changes implemented by the Whitlam government in the early 1970s were only just now starting to show up in the stocks of human capital in Australia.

### Choice of counterfactual

It was noted that a researchers' choice of counterfactual scenarios — that is, what is likely to occur if a particular reform did not take place — would affect the estimated benefits from particular reforms. For example in the session paper, Quiggin observed that convergence of growth rates across developed countries limited the extent to which microeconomic reform could improve Australia’s growth rate. This implicitly suggested that the choice was between being just below the frontier and on the frontier. However, one participant noted that in the event that Australia did not continue with a process of microeconomic reform, the continual outward movement of the best-practice frontier might result in Australia falling further behind this frontier. For these reasons, the actual effects of microeconomic reform upon productivity growth and welfare may be substantially larger than if a static-benchmark is assumed.

Quiggin agreed that choosing an appropriate counterfactual scenario was always a problem. However, he suggested that the apparent convergence of growth rates between countries placed at least an upper bound on what could be achieved. He also suggested that the performance of other countries with similar economic structures could be adopted as an alternative benchmark for assessing the potential growth effects of reform. Finally, he observed that a comparison between Australia and New Zealand suggested that a less radical approach to reform was preferable.

### Policy changes that constitute microeconomic reform

There was agreement that there is no universally accepted definition of the policies encompassed by microeconomic reform. For example, in some cases deregulation is advisable, while in other cases it is not. Some would only include ‘appropriate’ deregulation in the set of microeconomic reforms, while others include all deregulation. This raises the possibility that measures of the overall effects of reform policies could vary because of different treatments of ‘good’ reforms and ‘bad’ reforms.

### Definitional issues

One of the problems identified for managing and monitoring the microeconomic reform process was the changing nature and focus of reforms. This led to a comment on the need to clearly define expressions such as ‘allocative effect’ and ‘allocative efficiency’. For this commentator, allocative issues in the microeconomic sense referred to the selection of a cost minimising set of inputs. Improving allocative efficiency therefore is associated with a move towards a more efficient use of inputs, given prices. In a macroeconomic sense, allocative efficiency can be used to refer to the composition of output across products or sectors.

It was also suggested that recent reform in Australia can be separated into two distinct phases. From 1973 to about 1986, reform could be summed up as getting relative prices right and the removal of restrictions on input use. More recently, reform has been concerned with some loosely-defined collection of principle-agent problems, public sector ownership issues and regulatory issues. A large measure of the problem of defining economic processes of reform has been associated with defining what reform is about and how it changes over time.

### The use of computable general equilibrium (CGE) models

Many of the comments made in this session related to estimating the benefits of microeconomic reform, and particularly those calculated by applying productivity shocks to a CGE model. The view was expressed that more attention needed to be given to the initial effects of microeconomic reform upon productivity, so that shocks of appropriate size are applied to the CGE models. There was agreement that a central element in assessing the effects of microeconomic reform was to improve the veracity of productivity shocks in advance of model simulations.

# PART C: INTERNATIONAL DEVELOPMENTS AND EXPERIENCE

# 5 EXPLAINING THE PICK-UP IN AUSTRALIAN PRODUCTIVITY PERFORMANCE

*Steve Dowrick*[1]

## 5.1 Introduction

A recent research paper from the Industry Commission (1997) suggests that underlying productivity growth increased substantially during the 1990s in Australia. Their evidence relates to multifactor productivity (MFP) in the non-farm market sector of the economy, where annual growth averaging 1.2 per cent was recorded between 1988–89 and 1995–96, with an apparent rising trend. To quote selectively from their introductory comments:

> There are signs, however, that Australia's productivity performance has improved markedly in the 1990s. … Our current rate of multifactor productivity growth appears to be running at around 2 per cent a year or more …. Measured productivity growth can be artificially high coming out of recessions because of the ability of firms to draw readily on under utilised resources … [but] the current high rate of productivity growth could now only be weakly associated with recovery from the recession, if at all. (Industry Commission 1997, p. xvii)

One possible interpretation of the Industry Commission's findings is that the successive introduction of microeconomic reforms over the last decade or more, including a series of deregulations and privatisations, have started to show up in improved productivity growth. Whilst the Commission's paper is careful not to claim proof of such a link, their evidence is certainly suggestive that such a link might exist.

At this stage of work in progress, lacking quantitative measures of micro-reform, this paper does not contain any direct testing of the links between Australian microeconomic reform and productivity growth. Rather, it examines the timing and magnitude of increased productivity growth. Then, it looks to comparisons with other countries to see if there might be international factors at work. The international comparisons also enable a cursory assessment of whether those countries which have gone through extensive market reform have also tended to experience above average productivity performance.

[1] I acknowledge with thanks helpful comments and suggestions from Trevor Breusch and participants at the workshop.

A previous paper by Dowrick (1990) applied a simple econometric model to Australian market sector data in order to disentangle the factors behind the 1980s slump in labour productivity growth. Much of the apparent slowdown after 1983 was attributable to capital dilution, reflecting a slight fall in investment rates and particularly rapid expansion of employment and hours worked between 1983 and 1988. Taking account of cyclical variation in productivity levels, due to 'hoarding' of capital and labour in downturns, the study concluded that underlying multifactor productivity growth had not declined subsequent to the introduction of centralised wage setting in 1983. Rather, it was the wage restraint of the Accord which had contributed to high employment growth and the consequent slowdown in labour productivity.

The starting point for this study is a student research paper by Lowe (1997). Lowe examines the claim that the rising growth in labour productivity of the 1990s represented true underlying productivity growth rather than mere cyclical recovery (which might be expected to be reversed in a subsequent economic slowdown). He used a time-series analysis which tested for cointegration and allowed for both dynamic and long-run interactions between capital stock and output. Using a growth accounting interpretation he estimated that underlying MFP growth in the non-farm market sector was 0.7 per cent per annum throughout the 1970s and 1980s. His estimates also showed that MFP growth accelerated by 1.4 percentage points to 2.1 per cent per annum in the 1990s.

These results of Lowe's lend support to the Industry Commission's claims that the substantial labour productivity pick-up since 1990 is not an artefact of either capital deepening or of cyclical recovery.

The relevance of this result is that if the economic reforms of the last decade have indeed produced conditions conducive to faster technical progress, then this should be reflected in trend MFP growth. Reforms which increase efficiency and technical progress should also increase returns to capital and induce higher rates of investment. As long as those conditions remain in place (or as long as the process of reform continues apace) then we might expect accelerated growth to continue into the future.[2] Lowe's results suggest that

[2] Trends in MFP growth are probably the closest we can get in the measurement of economic aggregates to the underlying rate of technical progress. But we should remember that the growth accounting approach which underlies MFP measurement only gives the proximate contribution of technical progress to overall growth in labour productivity and living standards. To the extent that technical progress raises the average and marginal product of capital, it also raises the rate of profitable investment. So the overall contribution of technical change to growth should include the indirect effect which works through changes in capital intensity.

such a positive interpretation of the recent pick-up in productivity growth is at least feasible, if not proven.

There are, of course, factors other than the program of micro-economic reform, which might have led to the Australian productivity pick-up. I list here only some of those which have been the subject of investigation in the recent literature on economic growth, though no doubt many other factors could be cited:

- a better educated labour force — which Barro (1991) and Barro and Lee (1994) find to be an important determinant of growth;
- changes in the rate of investment in the core public infrastructure of transport and communication and water systems. Increased public infrastructure has been found to raise private sector productivity (as conventionally measured) in a wide range of studies, including the Aschauer (1989) study of aggregate United States data, the Morrison and Schwartz (1996) study of United States state productivity, a cross-country study by Easterly and Rebelo (1993) and the study of Australian aggregate productivity by Otto and Voss (1994). However, the fact that Australian public investment has been declining rather than increasing makes it unlikely that this can explain an increase in productivity growth;
- shifting investment towards equipment rather than buildings is argued by De Long and Summers (1991) to be important in raising productivity because of technological and learning externalities which raise the social return to equipment investment above the private return. Sala-i-Martin (1997) reports this effect to be consistently significant in his (in-)famous two million cross-country regressions which estimate the gross annual return on equipment investment to be 21 per cent in comparison with a 5 per cent return on non-equipment investment;
- the degree of openness of the economy — argued to be a spur to technical progress through increased competition, specialisation and transfer of knowledge. On the other hand, those countries which specialise in low technology goods and services might record lower rates of growth in conventional constant price measures of productivity which ignore the potentially welfare improving benefits from improving terms of trade; and
- an increase in the rate of technical progress amongst leading economies, with spillover benefits to Australian producers raising local productivity growth.

As yet, I have been able to construct variables representing only the openness, the education and the technological transfer factors. The procedure I adopt in Section 5.2 is to estimate trends in Australian productivity growth using time-series data on output and capital which has been updated to include the latest financial year, 1996–97. Section 5.3 then uses a panel data set to investigate growth across OECD countries over the last three decades and to test some of the hypotheses outlined above. Some concluding remarks are provided in Section 5.4.

## 5.2 Time-series analysis of productivity trends in the non-farm market sector

I begin with a Cobb-Douglas aggregate production function with constant returns to the net capital stock ($K_t$) and the level of employment ($L_t$), and an exponential time trend, $\lambda$, representing the rate of exogenous technical progress. This enables us to write the long-run relationship, at time $T$, between the log of aggregate output per worker, $\ln(Y/L) \equiv y$, and log capital intensity $\ln(K/L) \equiv k$, as:

$$y_T = a + \alpha\, k_T + \lambda T. \tag{5.1}$$

This is a long-run relationship in the sense that it holds only when both capital and labour are fully and efficiently employed. Long-run multifactor productivity is defined as $MFP_T \equiv y_T - \alpha\, k_T = a + \lambda T$.

In the short run, when shocks to aggregate demand are unanticipated, it is likely that labour productivity, $y$, will lie below the technically efficient level defined by equation (5.1). This is because employment is sticky in the short run. A firm considering whether to lay off workers immediately will anticipate direct lay-off costs such as contractual redundancy payments and further costs of recruitment and retraining as and when demand recovers. A negative shock to demand will result, in the short term, in some degree of labour hoarding. We also expect that adjustment and information costs will prevent the immediate adjustment of capital. Hence, the common observation that productivity moves pro cyclically.

If shocks prove to be more than temporary, we expect firms to revise expectations and adjust their output and inputs to long-run profit-maximising levels, implying that the relationship between $y$ and $k$ returns to the technically efficient levels defined by equation (5.1). To the extent that the previous period's labour productivity was below the efficient level, productivity will increase. A simple dynamic error-correction model (ECM) can capture this process: [3]

3 See Wickens and Breusch (1988) for discussion on specifications of the ECM.

$$\Delta y_t = \left[\theta_1 \Delta k_t + \theta_2 \lambda\right] + \theta_3 \left[\alpha k_{t-1} + \lambda (t-1) - y_t - 1\right] + \varepsilon_t \qquad (5.2)$$

The first term in square brackets explains a portion of current growth in labour productivity as a function of the concurrent growth in capital intensity and technical progress (lagged growth may also be important). The second square-bracketed term represents the extent to which previous period output fell below its long-run efficient relationship with capital intensity. The coefficient $\theta_3$ captures the speed of adjustment — the proportion of the gap that is corrected in the subsequent period. A value of zero for $\theta_3$ would imply no adjustment. This would also imply the absence of a cointegrating relationship. A value of unity would imply full adjustment in the year immediately following a shock.

Figure 5.1 displays Australian Bureau of Statistics (ABS) estimates of real output, labour hours and the capital stock of the non-farm market sector, from 1964–65 to 1996–97. All three series are indices normalised to a value of 100 in 1989–90. The ratios of output and capital stock to total hours worked are displayed in Figure 5.2. The average annual growth rate of labour productivity is 2.1 per cent with a standard deviation of 2.0 percentage points. The average annual rate of growth of capital stock per hour worked is 2.6 per cent with a standard deviation of 2.4 percentage points.

Estimation of equation (5.2) is reported in Table 5.1.

The negative coefficient on lagged labour productivity ($y_{t-1}$) confirms the existence of a long-run cointegrating relationship between labour productivity ($y$) and capital intensity ($k$). The time-series of these two variables are displayed in Figure 5.2, each indexed to 100 in 1989–90.

The long-run relationship between labour productivity, capital intensity and the three time trends (cols 4 and 5 Table 5.1) is derived from equation (5.2) by setting all the change terms to zero:

$$\begin{aligned} y_t = 0.32\ &k_t + 0.021\ T_{64} - 0.014\ T_{74} + 0.012\ T_{90} \\ &(t=4) \quad (t=7) \quad (t=-8) \quad (t=5) \end{aligned} \qquad (5.2)$$

These estimates of the long-run coefficients imply that the elasticity of output with respect to capital is 0.32. This is well within the expected range, slightly lower than the ABS's reported figure of 0.35 for the average share of capital in income.

## Table 5.1: **Error correction estimation of productivity in the non-farm market sector, 1964–65 to 1996–97**

| *Explanatory variables* | *Coefficients* | *t-ratio* | *Long-run coefficients* | *t-ratio* |
|---|---|---|---|---|
| $y_{t-1}$ | -1.35 | -6.0 | | |
| $k_{t-1}$ | 0.43 | 3.7 | 0.320 | 4.4 |
| $T64_{t-1}$ | 0.029 | 4.7 | 0.021 | 7.5 |
| $T74_{t-1}$ | -0.018 | -5.2 | -0.014 | -7.9 |
| $T90_{t-1}$ | 0.016 | 4.0 | 0.012 | 4.9 |
| $\Delta k$ | 0.266 | 1.8 | | |
| $\Delta T74$ | -0.016 | -1.0 | | |
| $\Delta T90$ | -0.006 | -0.3 | | |
| $\Delta y_{t-1}$ | 0.41 | 2.7 | | |
| $\Delta k_{t-1}$ | -0.29 | -1.8 | | |
| $\Delta T74_{t-1}$ | 0.033 | 2.0 | | |
| $\Delta T90_{t-1}$ | -0.015 | -0.7 | | |
| *constant* | -0.44 | -4.2 | | |

$R^2 = 0.7485$ adj. $R^2 = 0.5809$ s.e. = 0.012
Residual correllogram: *rho* (t-stat) j=1, 2, 3, 4 = -0.23 (-1.2), -0.12 (-0.7), -0.04 (-0.2), 0.03 (0.2).
*y* is the log of output per hour worked.
*k* is the log of capital stock per hour worked.
*T*xx is a time trend variable which is zero up to 19xx and increments by one every year thereafter.
$x_{t-1}$ is lag(x), and $\Delta x$ is $(x - x_{t-1})$.
*Data source*: ABS Cat. No. 5234.0 (1995–96 ed.); updated from 1995–96 to 1996–97 by the author.

Figure 5.1: **Trends in output, and labour and capital inputs, 1964 to 1997** (indexes 1989–90=100)

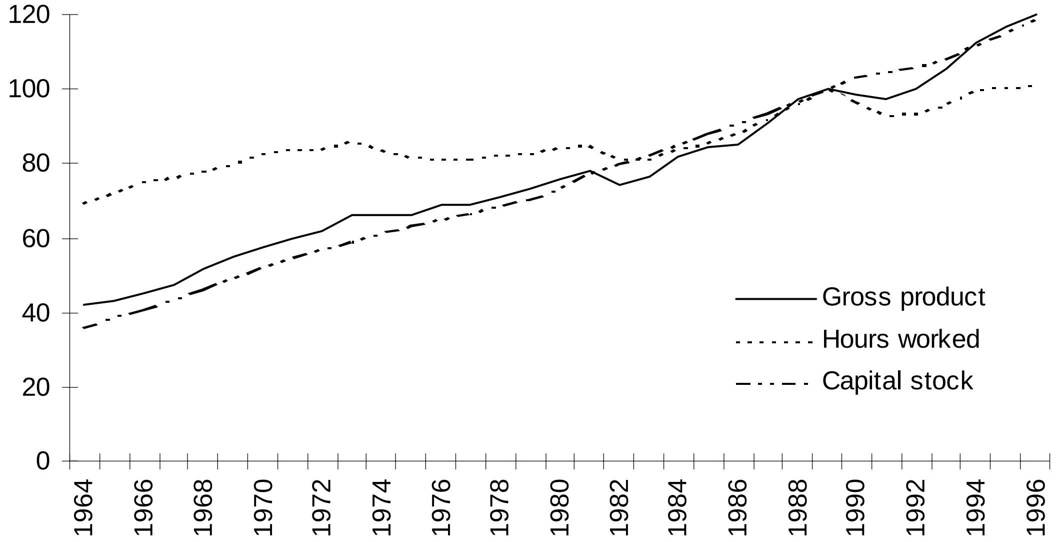
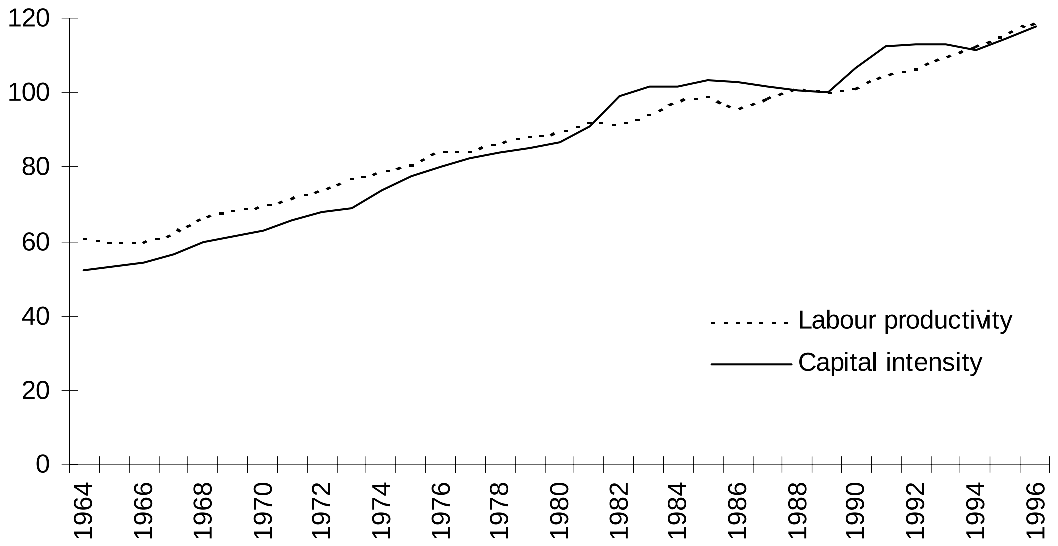



Figure 5.2: **Trends in labour productivity and capital intensity, 1964 to 1997** (indexes 1989–90=100)




*Source*: ABS Cat. No. 5234.0 (1995–96 ed.); updated from 1995–96 to 1996–97 by author.

The coefficients on the time trends should be interpreted as estimates of underlying multifactor productivity growth, independent of cyclical effects. Note that the coefficients on T74 and T90 capture changes in the underlying trend. Annual multifactor productivity (MFP) growth was 2.1 per cent between 1964 and 1973. Productivity growth then slumped by nearly one and a half percentage points, matching a worldwide slowdown. But the trend rate of MFP growth has increased from 1990 by 1.2 percentage points. Thus, trend MFP growth is estimated to be 1.9 per cent[4] per year in the 1990s, back to the historically high productivity growth of the 1960s. These estimates confirm the earlier finding of Lowe (1997) and the Industry Commission (1997) that MFP growth in Australia during the 1990s has been about 2 per cent per annum.

This remarkable recovery in productivity growth could have a number of explanations, as discussed in the introduction. The dynamic estimation method has corrected for cyclical variability, eliminating that as a possible explanation for the observed acceleration. The next section uses international comparisons to examine some of the other hypothesised explanations.

## 5.3 Panel data analysis of OECD productivity growth

The time-series analysis of the preceding section has established that productivity in Australia accelerated since 1990, over and beyond the short-term effects of cyclical recovery. This section analyses evidence of causes of the productivity pick-up, looking to see whether there has been a general return amongst the industrialised economies to the growth rates of the 1960s. Using international data on economic growth also enables testing of the hypotheses that exceptional investment in Australian human capital, or Australia's expansion of international trade, can explain the acceleration.

It is difficult to get reliable and consistent international data on capital stocks. Accordingly, I switch to a modelling strategy using standardised OECD investment data. This implies that the dependent variable is the growth (rather than the level) of real output. The underlying model is of an aggregate production function where capital, labour and technology are the inputs such that $Y = e^{\tau t}F(K,L)$. Differentiating and dividing by $Y$ yields:

$$\frac{dY}{Y} = \left[F_K\right]\frac{dK}{Y} + \left[F_L\,\frac{L}{Y}\right]\frac{dL}{L} + \tau \qquad (5.5)$$

4 This figure is derived as the sum of the time trend coefficients (0.021 – 0.014 + 0.012) expressed as a percentage growth rate.

Econometric estimation requires that we decide which of these terms are to be treated as constant parameters. It is common practice to treat the marginal product of capital as constant across countries, citing capital mobility which equates returns at the margin. (This argument suggests, however, that the parameter might vary over time as real rates of interest vary.) This approach is particularly convenient in that it does not require the measurement of capital stocks; rather it makes the independent variable *dK/Y* which can be measured with greater accuracy. It represents the flow of gross investment as a proportion of gross domestic product.

The bracketed part of the second term in (5.5) can also be treated as a parameter that, with competitive markets, measures labour's share in national income. Although this share can and does vary across countries, especially the less developed economies, it accords with the stylised facts of the industrialised economies to treat it as constant.

The final term to be specified is the technical progress, $\tau$. I follow previous work such as Dowrick and Nguyen (1989), Barro (1991) and Sala-i-Martin (1997) in supposing that technical progress may be influenced by the opportunity to import or copy from more advanced economies, suggesting that there will be a negative relationship between income levels and subsequent growth.

The degree of openness to trade is often cited as a stimulus to faster growth, so I include a measure of openness based on the residuals to the regression of trade shares on population. There has been debate on whether levels of education predispose a country both to be more inventive and also to better absorb overseas inventions, see Coe and Helpman (1995) and Grossman and Helpman (1990), so I also control for the stock of human capital, proxied by the average years of schooling of the adult population.

I have picked four periods for averaging growth, 1960–73, 1973–79, 1979–90 and 1990–96. These periods run peak-to-peak for the business cycles experienced in the United States and much of the OECD. A general specification for the technical progress term, $\tau_{it}$, allows for period (*t*) specific and country (*i*) specific effects in addition to the deterministic variables discussed above, implying:

$$\tau_{it} = \gamma_0 + \gamma_1 y_{it} + \gamma_2 OPEN_{it} + \gamma_3 EDUC_{it} + \varepsilon_i + \varepsilon_t + \varepsilon_{it} \tag{5.6}$$

where *y* measures initial *per capita* GDP and the final error term captures residual cyclical and other factors. These other factors include the effects of economic policies, to the extent that their effects are not captured through other explanatory variables such as investment and employment.

Table 5.2 reports the preferred regression estimates of equation (5.5)–(5.6) which includes period effects but no country effects. The coefficient on initial income levels is negative, confirming technology catch-up. The investment coefficient suggests a gross rate of return of 7 per cent, perhaps lower than one might expect, but in line with that found in other applied studies such as Barro and Sala-i-Martin (1995). The estimated employment to output elasticity is 0.52. The time trend and dummies are all strongly significant, suggesting that the underlying annual rate of technical progress in OECD countries fell by some 2 per cent in the wake of the 1973 oil price shocks and has, if anything, fallen slightly further in the 1990s.

A variable measuring the average years of education in the workforce (from Barro and Lee) was included in the initial specification. It added no explanatory power, so it has been dropped from the results reported here.

Table 5.2: **Panel estimation of the proximate causes of growth in 21 OECD countries, 1960 to 1973, 1973 to 1979, 1979 to 1990, 1990 to 1996**, (dependent variable is the annual growth rate of real GDP, mean=0.030)

| *Explanatory variable*[a] | *Coefficient* | *t-ratio* |
|---|---|---|
| Initial income (*y*) | -0.0015 | -1.9 |
| Investment (*I/Y*) | 0.070 | 2.5 |
| Employment growth (*dL/L*) | 0.52 | 2.5 |
| Openness ($\gamma_2$) | -0.001 | -0.3 |
| Constant (1960–96) ($\gamma_0$) | 0.030 | 4.2 |
| Period dummy (1973–79) | -0.020 | -6.4 |
| Period dummy (1979–90) | -0.021 | -6.2 |
| Period dummy (1990–96) | -0.025 | -6.4 |
| Adjusted $R^2$ | 0.628 | |
| Standard error of estimate | 0.010 | |
| Test fixed country effects | $F_{20,56} = 0.77$ | |

*a* The human capital ($\gamma_3$) variable was statistically insignificant and has been omitted.

The variable representing the degree of openness of each economy has been derived as the residual to the regression of trade share in GDP on the size of the population. This procedure recognises that a large country such as the United States, which conducts most of its trade internally, is relatively open to international trade although the ratio of trade to GDP is low. However, the reported coefficient is very small and is statistically insignificant, suggesting that within the OECD group there is little direct impact of openness on productivity growth. (This does not mean that there is no impact on overall growth, however, since the effect could be transmitted through investment and employment).

The result of most interest to us is that there is no discernible rise in OECD MFP growth in the 1990s. The reported constant term in the regression represents the residual growth in the first period. The period dummies capture subsequent changes relative to the base period. The very strong productivity growth of the 1960 to 1973 period (averaging 3 per cent per year) has fallen to under 1 per cent per year since 1973. The fact that there has been no general acceleration in OECD productivity during the 1990s suggests that Australia's recent productivity pick-up reflects domestic rather than international factors.

We can use these estimates to decompose the observed rate of growth of the Australian economy into contributions explained by the systematic effects of technical spillover, investment, employment growth, openness and by the period effects which capture changes in the rate of technical progress in leading countries. The residual, unexplained part of Australian growth performance is where we might expect to see some evidence of peculiarly Australian factors which might include periods of microeconomic reform.

This decomposition of proximate sources of growth is presented in Table 5.3. Everything is expressed relative to the OECD mean over the whole period. The mean growth rate of real GDP for OECD countries was 3 per cent per year, so the entry of 1.9 per cent for growth of output over the period 1960 to 1973 indicates that Australian growth over that period averaged 4.9 per cent (ie 3 *plus* 1.9 per cent per year). The domestic contributors to above average growth were above average investment and employment growth. Australia could also have been expected to share in worldwide rapid technical progress — captured by the period effect of +1.7 per cent. But the negative residual indicates that over the 1960s Australian productivity growth lagged behind that of comparable OECD countries.

Table 5.3: **Contributions to annual growth of real GDP in Australia, relative to average OECD growth of 3 per cent per annum, 1960 to 1996** (percentage points)

| | *Growth of output* = | *Contrib- utions of catch-up* + | *Invest- ment* + | *Employ- ment growth* + | *Openness* + | *Period effect* + | *Resid- ual growth* |
|---|---|---|---|---|---|---|---|
| 1960–73 | 1.9% | 0.0% | 0.7% | 0.9% | 0.1% | 1.7% | -1.4% |
| 1973–79 | -0.1% | 0.0% | 0.3% | 0.1% | 0.1% | -0.4% | -0.1% |
| 1979–90 | 0.1% | -0.1% | 0.3% | 0.8% | 0.1% | -0.5% | -0.5% |
| 1991–96 | -0.1% | -0.1% | -0.2% | 0.1% | 0.0% | -0.8% | 0.8% |
| 1960–96 | 0.4% | -0.1% | 0.3% | 0.5% | 0.1% | 0.0% | -0.3% |

Turning to the fourth line of the table, growth of real output over the period 1991–96 has been slightly under three percent. Sluggish investment implied a negative contribution relative to the OECD average. Employment growth has not been strong. However, the most significant finding is that other countries have, on average, experienced further slowdowns in productivity growth — but Australian productivity growth has been 0.8 percentage points above average. Since 1973, Australian productivity averaged 0.3 percentage points below the OECD average, so the post 1990 performance represents an improvement in annual MFP growth of 1.1 percentage points over the previous two decades. This estimate of the acceleration in productivity growth is substantial, and remarkably close to the time series estimate of 1.2 per cent reported in the previous section.

The Appendix to this paper presents a similar decomposition for all the 21 countries of the OECD panel. The countries which exhibit unusually strong productivity growth in the 1990s (ie more than 0.5 percentage points above predicted) are, in ascending order: United States, Australia, Iceland, United Kingdom, Sweden, Denmark, Norway and Ireland.

It remains for further work to analyse the common factors that might account for these countries' strong productivity performance. But at first glance the evidence does not appear to give any strong confirmation that programs of pro-market economic restructuring have had a consistently positive effect on productivity performance. Whilst Australia and the United Kingdom are in the leading group, New Zealand's productivity performance in the 1990s has been substantially below average.

## 5.4 Concluding comments

This paper has reported work in progress on two quite different methods of analysing Australian productivity performance. The first involved specification of a time series model which captures both medium term trends and the shorter-term adjustment processes of the business cycle. The second involved construction of a panel of OECD countries and concentrated on the medium term by averaging data over one or more business cycles.

The most striking result is that both methods confirm that over the 1990s underlying productivity growth in Australia accelerated by over 1 percentage point per annum.

These findings control in different ways for the well-known pro-cyclical effects of the business cycle on short-term productivity measures. They also control for some of the other measurable factors which have been hypothesised to influence productivity growth: technological spillovers from other countries, trade, differences in human capital stocks, and periodic changes in the rate of invention.

I started this paper with reference to the suggestion that Australia's recent performance may have been due in part to the series of microeconomic reforms, which have taken place over the last decade or more. The studies reported here have not addressed that question directly, lacking the systematic modelling and measurement of 'micro-reform' that would be needed to perform direct statistical tests on macroeconomic data. But at least we have eliminated some other potential explanations for the productivity pick-up, such as cyclical recovery, trade expansion or a worldwide productivity boom.

If the microeconomic reform/aggregate productivity link has not been disproved by the evidence presented here, it still has a long way to go to claim confirmation. Some of the challenges will involve explanations of the very disparate performances of other countries, most notably New Zealand, which have undergone lengthy and intensive microeconomic reform programs but have failed to exhibit faster productivity growth in the 1990s.

There is also an important puzzle in recent Australian macroeconomic performance, namely the weakness of investment and employment growth in the 1990s, despite a prolonged recovery in the business cycle. If microeconomic reform has increased technical progress and productivity, then increased returns to investment should have caused a significant rise in investment. But investment has remained weak. There has been no wage explosion to dampen down investment and employment growth, so the puzzle remains. With weak investment and employment, productivity growth does not necessarily translate into rising income and welfare for the society as a whole.

## Appendix: **Decomposition of proximate causes of growth**

| | | *Period* | *GDP growth* | *Initial income* | *Investment* | *Employment growth* | *Openness* | *Period effects* | *Residual MFP* |
|---|---|---|---|---|---|---|---|---|---|
| 1 | United States | 1960–73 | 1.2% | -0.1% | -0.9% | 0.7% | 0.0% | 1.7% | **-0.2%** |
| | | 1973-79 | -0.2% | -0.1% | -1.0% | 0.9% | 0.0% | -0.4% | **0.4%** |
| | | 1979-90 | -0.4% | -0.1% | -0.9% | 0.5% | 0.0% | -0.5% | **0.7%** |
| | | 1990-96 | -1.0% | -0.1% | -1.0% | 0.2% | -0.1% | -0.8% | **0.8%** |
| 2 | Japan | 1960-73 | 6.0% | 0.0% | 0.9% | 0.3% | 0.1% | 1.7% | **3.0%** |
| | | 1973-79 | 0.4% | 0.0% | 1.2% | 0.0% | 0.0% | -0.4% | **-0.3%** |
| | | 1979-90 | 0.8% | -0.1% | 1.0% | 0.3% | 0.0% | -0.5% | **0.1%** |
| | | 1990-96 | -1.3% | -0.1% | 1.4% | 0.0% | 0.0% | -0.8% | **-1.8%** |
| 3 | Germany | 1960-73 | 1.3% | 0.0% | 0.7% | -0.2% | 0.0% | 1.7% | **-0.8%** |
| | | 1973-79 | -0.7% | -0.1% | -0.1% | -0.5% | 0.0% | -0.4% | **0.5%** |
| | | 1979-90 | -0.9% | -0.1% | -0.3% | 0.0% | 0.0% | -0.5% | **0.1%** |
| | | 1990-96 | 0.2% | -0.1% | 0.0% | 1.3% | 0.0% | -0.8% | **-0.2%** |

.../continued

Appendix: (continued)

| | | *Period* | *GDP growth* | *Initial income* | *Investment* | *Employment growth* | *Openness* | *Period effects* | *Residual MFP* |
|---|---|---|---|---|---|---|---|---|---|
| 4 | France | 1960-73 | 2.3% | 0.0% | 0.3% | 0.0% | 0.0% | 1.7% | **0.3%** |
| | | 1973-79 | -0.2% | -0.1% | 0.2% | -0.2% | 0.0% | -0.4% | **0.2%** |
| | | 1979-90 | -0.7% | -0.1% | -0.2% | -0.2% | 0.0% | -0.5% | **0.3%** |
| | | 1990-96 | -1.9% | -0.1% | -0.3% | -0.5% | 0.0% | -0.8% | **-0.2%** |
| 5 | United Kingdom | 1960-73 | 0.1% | 0.0% | -0.7% | -0.2% | 0.0% | 1.7% | **-0.6%** |
| | | 1973-79 | -1.5% | 0.0% | -0.8% | -0.2% | 0.0% | -0.4% | **-0.1%** |
| | | 1979-90 | -0.8% | -0.1% | -0.8% | -0.1% | 0.0% | -0.5% | **0.7%** |
| | | 1990-96 | -1.7% | -0.1% | -0.9% | -0.8% | 0.0% | -0.8% | **0.9%** |
| 6 | Italy | 1960-73 | 2.1% | 0.0% | 0.7% | -0.6% | 0.1% | 1.7% | **0.2%** |
| | | 1973-79 | 0.5% | 0.0% | -0.1% | 0.1% | 0.0% | -0.4% | **0.8%** |
| | | 1979-90 | -0.7% | -0.1% | -0.5% | -0.2% | 0.0% | -0.5% | **0.5%** |
| | | 1990-96 | -1.9% | -0.1% | -0.7% | -0.8% | 0.0% | -0.8% | **0.5%** |

.../continued

## Appendix: (continued)

| | | *Period* | *GDP growth* | *Initial income* | *Investment* | *Employment growth* | *Openness* | *Period effects* | *Residual MFP* |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Canada | 1960-73 | 2.3% | 0.0% | -0.8% | 1.3% | 0.0% | 1.7% | **0.1%** |
| | | 1973-79 | 1.1% | -0.1% | -0.7% | 1.1% | 0.0% | -0.4% | **1.1%** |
| | | 1979-90 | -0.3% | -0.1% | -0.3% | 0.6% | 0.0% | -0.5% | **0.0%** |
| | | 1990-96 | -1.5% | -0.1% | -0.2% | 0.0% | 0.0% | -0.8% | **-0.4%** |
| 8 | Australia | 1960-73 | 1.9% | 0.0% | 0.7% | 0.9% | 0.1% | 1.7% | **-1.4%** |
| | | 1973-79 | -0.1% | 0.0% | 0.3% | 0.1% | 0.1% | -0.4% | **-0.1%** |
| | | 1979-90 | 0.1% | -0.1% | 0.3% | 0.8% | 0.1% | -0.5% | **-0.5%** |
| | | 1990-96 | -0.1% | -0.1% | -0.2% | 0.1% | 0.0% | -0.8% | **0.8%** |
| 9 | New Zealand | 1960-73 | 0.6% | 0.0% | -0.5% | 0.7% | 0.1% | 1.7% | **-1.4%** |
| | | 1973-79 | -2.6% | 0.0% | -0.4% | 0.5% | 0.0% | -0.4% | **-2.3%** |
| | | 1979-90 | -0.8% | -0.1% | -0.5% | -0.3% | 0.0% | -0.5% | **0.5%** |
| | | 1990-96 | -1.3% | -0.1% | -0.6% | 0.8% | 0.0% | -0.8% | **-0.6%** |

.../continued

## Appendix: (continued)

| | | Period | GDP growth | Initial income | Investment | Employment growth | Openness | Period effects | Residual MFP |
|---|---|---|---|---|---|---|---|---|---|
| 10 | Austria | 1960-73 | 1.6% | 0.0% | 0.6% | -0.4% | 0.0% | 1.7% | **-0.3%** |
| | | 1973-79 | -0.1% | 0.0% | 0.7% | -0.2% | 0.0% | -0.4% | **-0.3%** |
| | | 1979-90 | -0.8% | -0.1% | 0.3% | -0.3% | 0.0% | -0.5% | **-0.2%** |
| | | 1990-96 | -1.2% | -0.1% | 0.7% | -0.2% | -0.1% | -0.8% | **-0.7%** |
| 11 | Belgium | 1960-73 | 1.8% | 0.0% | -0.3% | -0.1% | 0.0% | 1.7% | **0.5%** |
| | | 1973-79 | -0.8% | 0.0% | -0.4% | -0.3% | -0.1% | -0.4% | **0.5%** |
| | | 1979-90 | -0.9% | -0.1% | -1.0% | -0.3% | -0.1% | -0.5% | **1.0%** |
| | | 1990-96 | -1.8% | -0.1% | -0.7% | -0.5% | -0.1% | -0.8% | **0.4%** |
| 12 | Denmark | 1960-73 | 1.1% | 0.0% | 0.3% | 0.1% | 0.0% | 1.7% | **-0.9%** |
| | | 1973-79 | -1.1% | -0.1% | 0.0% | -0.2% | 0.0% | -0.4% | **-0.5%** |
| | | 1979-90 | -1.2% | -0.1% | -0.8% | -0.2% | 0.0% | -0.5% | **0.3%** |
| | | 1990-96 | -1.0% | -0.1% | -1.2% | -0.5% | 0.0% | -0.8% | **1.5%** |

.../continued

## Appendix: (continued)

| | | *Period* | *GDP growth* | *Initial income* | *Investment* | *Employment growth* | *Openness* | *Period effects* | *Residual MFP* |
|---|---|---|---|---|---|---|---|---|---|
| 13 | Finland | 1960-73 | 1.8% | 0.0% | 1.3% | -0.3% | 0.0% | 1.7% | **-1.0%** |
| | | 1973-79 | -0.7% | 0.0% | 1.0% | 0.0% | 0.0% | -0.4% | **-1.4%** |
| | | 1979-90 | 0.3% | -0.1% | 0.6% | 0.1% | 0.0% | -0.5% | **0.1%** |
| | | 1990-96 | -3.2% | -0.1% | -0.8% | -1.8% | 0.0% | -0.8% | **0.3%** |
| 14 | Greece | 1960-73 | 4.4% | 0.1% | 2.0% | -0.6% | 0.1% | 1.7% | **1.2%** |
| | | 1973-79 | 0.6% | 0.0% | 1.2% | -0.1% | 0.1% | -0.4% | **-0.2%** |
| | | 1979-90 | -1.4% | 0.0% | 0.2% | 0.2% | 0.0% | -0.5% | **-1.3%** |
| | | 1990-96 | -1.7% | 0.0% | 0.2% | -0.1% | 0.0% | -0.8% | **-0.9%** |
| 15 | Iceland | 1960-73 | 2.4% | 0.0% | 0.6% | 0.8% | 0.0% | 1.7% | **-0.6%** |
| | | 1973-79 | 2.2% | 0.0% | 0.5% | 0.7% | 0.0% | -0.4% | **1.4%** |
| | | 1979-90 | 0.0% | -0.1% | -0.3% | 0.6% | 0.0% | -0.5% | **0.3%** |
| | | 1990-96 | -1.4% | -0.1% | -1.0% | -0.3% | 0.0% | -0.8% | **0.8%** |

.../continued

## Appendix: (continued)

| | | Period | GDP growth | Initial income | Investment | Employment growth | Openness | Period effects | Residual MFP |
|---|---|---|---|---|---|---|---|---|---|
| 16 | Ireland | 1960-73 | 1.3% | 0.1% | -0.4% | -0.3% | 0.0% | 1.7% | **0.3%** |
| | | 1973-79 | 1.8% | 0.0% | 0.0% | 0.2% | 0.0% | -0.4% | **1.9%** |
| | | 1979-90 | 0.4% | 0.0% | -0.4% | -0.4% | 0.0% | -0.5% | **1.8%** |
| | | 1990-96 | 2.3% | -0.1% | -1.3% | 0.7% | -0.1% | -0.8% | **3.8%** |
| 17 | Netherlands | 1960-73 | 1.7% | 0.0% | 0.7% | -0.3% | 0.0% | 1.7% | **-0.4%** |
| | | 1973-79 | -0.4% | 0.0% | 0.0% | -0.2% | 0.0% | -0.4% | **0.3%** |
| | | 1979-90 | -0.9% | -0.1% | -0.4% | 0.1% | -0.1% | -0.5% | **-0.1%** |
| | | 1990-96 | -0.8% | -0.1% | -0.5% | 0.4% | -0.1% | -0.8% | **0.2%** |
| 18 | Norway | 1960-73 | 1.2% | 0.0% | 1.8% | 0.0% | 0.0% | 1.7% | **-2.2%** |
| | | 1973-79 | 1.8% | 0.0% | 2.3% | 0.7% | 0.0% | -0.4% | **-0.8%** |
| | | 1979-90 | -0.4% | -0.1% | 0.8% | -0.1% | 0.0% | -0.5% | **-0.6%** |
| | | 1990-96 | 0.6% | -0.1% | -0.4% | 0.0% | 0.0% | -0.8% | **1.9%** |

.../continued

## Appendix: (continued)

| | | *Period* | *GDP growth* | *Initial income* | *Investment* | *Employment growth* | *Openness* | *Period effects* | *Residual MFP* |
|---|---|---|---|---|---|---|---|---|---|
| 19 | Spain | 1960-73 | 4.1% | 1.1% | 0.1% | 0.0% | 0.1% | 1.7% | **1.2%** |
| | | 1973-79 | -0.7% | 1.0% | 0.1% | -0.8% | 0.0% | -0.4% | **-0.7%** |
| | | 1979-90 | -0.2% | 1.0% | -0.3% | -0.2% | 0.0% | -0.5% | **-0.2%** |
| | | 1990-96 | -1.6% | 1.0% | 0.1% | -0.7% | 0.0% | -0.8% | **-1.0%** |
| 20 | Sweden | 1960-73 | 1.0% | 0.0% | -0.2% | -0.1% | 0.0% | 1.7% | **-0.4%** |
| | | 1973-79 | -1.2% | -0.1% | -0.6% | 0.3% | 0.0% | -0.4% | **-0.5%** |
| | | 1979-90 | -1.0% | -0.1% | -0.7% | 0.0% | 0.0% | -0.5% | **0.2%** |
| | | 1990-96 | -2.4% | -0.1% | -1.0% | -1.4% | 0.0% | -0.8% | **1.0%** |
| 21 | Switzerland | 1960-73 | 1.4% | -0.1% | 0.5% | 0.4% | 0.0% | 1.7% | **-1.1%** |
| | | 1973-79 | -3.2% | -0.1% | 0.0% | -0.9% | 0.0% | -0.4% | **-1.9%** |
| | | 1979-90 | -0.7% | -0.1% | 0.7% | 0.6% | 0.0% | -0.5% | **-1.4%** |
| | | 1990-96 | -3.1% | -0.1% | 1.0% | -0.5% | 0.0% | -0.8% | **-2.7%** |

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## **Discussant** — *Malcolm Dowling*

I was struck by several arguments in Steve Dowrick's paper. First, the results of his production function estimation do not appear to be very robust. The fact that the capital share and labour share estimates tend to fluctuate substantially highlights the point that production functions are very hard to estimate. Dowrick has used an error correction model and tested for cointegration. So, his estimation methods are very modern and up to date. However, it might also be useful to augment these results by going back to simpler models of growth accounting of the Denison type. In a growth accounting framework, capital and labour coefficients are assumed and a residual measure of multifactor productivity calculated. Sensitivity analysis of these results could give further clues to how multifactor productivity is changing.

Secondly, what struck me in Dowrick's results is the similarity between Australia and a group of Asian countries that I explored in a recent paper with Peter Summers of the Melbourne Institute (see Dowling and Summers 1997). Using a slightly different method of measuring multifactor productivity growth, we found a similar U shaped cycle of technological progress with a trough in the 1970s. Our results built upon other work on these countries reported in the literature. We used a slightly different time period than Dowrick in our decade estimates. Instead of 1990 we began the final period in 1985, the time after the Plaza Accord when the yen appreciated rapidly and the flow of foreign direct investment (FDI) into Asia accelerated.

Is this finding of rapid multifactor productivity growth before and after the period of the two oil shocks in both Australia and the developing countries of Asia a coincidence? Or is there something more to this relationship? Is the fact that Australia has become more closely integrated with the Asian economies in the past decade or so, been responsible for greater technological transfer and a higher rate of productivity growth? On the surface, this does not seem to be plausible. Australia is basically a supplier of raw materials to Asia and has not been a part of the 'flying geese' story that has been told for the rest of the region. However, there has also been significant deregulation in Australia and this, along with greater investment in education which is also a feature that Australia has in common with Asia, has been a factor in boosting productivity in both regions in the last decade. Furthermore, the raw materials that Australia has exported to Asia have been inputs to manufactured goods exports by those economies. So in this respect, Australia has been a partner in Asia's export boom through its supplier relationships. The question is whether new technology and organisational changes have accompanied this interrelated growth cycle.

Krugman, Lau and Young have all argued that multifactor productivity growth in Asia is low. However all those studies were done with data from the 1970s and 1980s. When we add the decade from 1985 to 1995 we are able to reject this explanation since there is a fairly large increase in productivity for those Asian countries. The reason for this, we speculate, is greater openness and better education, both factors that Dowrick has put into his estimating equation and which are not significant in his regressions for Australia. Openness also provided greater stimulus for the flow of foreign direct investment, which also increased after the Plaza Accord. The combination of these three factors — a more open trading environment, trade liberalisation and exchange rate realignment — led to greater foreign direct investment and technological transfer and greater multifactor productivity growth in Asia.

I wonder whether a similar set of factors could have been partly responsible for the spurt of multifactor productivity growth in Australian in the 1990s. Australia also had significant currency depreciation although the share of manufacturing exports as a per cent of total exports probably did not increase as rapidly as it did within Asia. There was also significant deregulation and liberalisation in Australia during the 1990s.

It may be useful to explore the comparison between Asia and Australia further. One possibility would be to recalibrate Dowrick's model using 1985 as a break point rather than 1990. In addition to facilitating comparisons with Asia this recalibration of the model would include the second post oil shock years in the earlier period.

I have two final points. Up to now, nobody has mentioned inter-industry shifts from low- to high-productivity growth activities as a possible cause of increasing multifactor productivity. This was a significant source of productivity gain in Asia over the past three decades. But this seems not to be the case in Australia and this is another significant difference between the Asian and Australian experiences. Inter-industry shifts have not been an important source of productivity gain in Australia, since the move toward manufacturing has not been as strong as it has been in Asia.

Secondly, openness and education are not significant in Dowrick's study of multifactor productivity; yet both of these variables are significant in many other studies. Why? It suggests to me that some adjustment of model specification and estimation might be appropriate. On the other hand, Dowrick's results do suggest more productivity growth in the 1990s for Australia and this does fit together with the story that I am telling for the Asian countries over this period as well.

## Reference

Dowling, M. and Summers, P. M. 1997, *Total Productivity Growth and Economic Growth — Issues for Asia*, Research Paper No. 594, Department of Economics, University of Melbourne, forthcoming in Economic Record, June 1998.

## **Discussant** — *Tony Urbanski*

A common refrain from economists and governments, both state and Federal, is that Australia needs to boost productivity growth and raise living standards. Most recently in the Investment for Growth statement, the Commonwealth Government indicated that it expected that the benefits of microeconomic reform to date, many of which are yet to be reaped, plus the benefits of taxation reform will contribute substantially to the overriding aim of delivering to Australia an annual growth rate of over 4 per cent on average over the decade to 2010.

I think the most striking conclusion from Steve Dowrick’s paper is that there has been a trend improvement in the rate of productivity growth in Australia in the 1990s as compared to earlier decades. This finding is consistent with the analyses published by the Industry Commission and the Reserve Bank of Australia. I think his international comparisons are also useful. They suggest the shift to a higher trend rate of productivity growth is home grown, rather than being part of an international shift to higher levels of productivity, say, due to factors such as product technology. While these findings may be good news, there is no need to get carried away with the results so far. It is in fact quite sobering to see how poorly Australia has performed internationally for more than a century when we examine levels of labour productivity growth (Table 5.D1).

This table shows levels of low productivity for a number of OECD countries over the last 100 years or so. When you look at it — and if you accept that the supply of labour, capital and technology environments across OECD countries is not too different — then this suggests that in the United States it is possible to get on average more than 25 per cent more from the same level of inputs as we can here, in Australia. These are on average figures and in some areas of manufacturing, productivity levels can be of the order of 40 and 50 per cent. I would make two observations about international comparisons of productivity levels. First, even though gains in productivity in the early 1990s are good news there is still a considerable bounty to be reaped. Second, further work on international productivity trends, along the lines of Dowrick's paper, can assist us in pointing to the areas we need to focus on.

Table 5.D1 **Comparative levels of labour productivity,[a] selected OECD countries, 1870 to 1992** (index USA=100)

| *Country* | *1870* | *1913* | *1929* | *1938* | *1950* | *1973* | *1992* |
|---|---|---|---|---|---|---|---|
| United States | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Canada | 71 | 82 | 69 | 61 | 77 | 81 | 87 |
| Japan | 20 | 20 | 24 | 25 | 16 | 48 | 69 |
| Germany | 70 | 68 | 58 | 56 | 35 | 71 | 95 |
| France | 60 | 56 | 55 | 62 | 45 | 76 | 102 |
| Italy | 46 | 41 | 38 | 44 | 34 | 66 | 85 |
| United Kingdom | 115 | 86 | 74 | 69 | 62 | 68 | 82 |
| **Australia** | **147** | **103** | **86** | **83** | **69** | **72** | **78** |
| Belgium | 94 | 57 | 44 | 39 | 32 | 65 | 83 |
| Netherlands | 103 | 78 | 84 | 72 | 51 | 81 | 99 |
| Denmark | 67 | 66 | 68 | 61 | 46 | 68 | 75 |
| Sweden | 54 | 50 | 44 | 49 | 56 | 77 | 79 |
| Finland | 37 | 35 | 34 | 36 | 32 | 57 | 70 |

a GDP per person hour.

*Source:* Industry Commission (1997, Table 6.1) using data from Maddison (1995).

Having made those points, let me bring a policy-adviser perspective to the paper. What I would have liked to have seen more of in the paper — and perhaps this is something that could be explored a bit further in discussion — is what is it that has brought about this fundamental change in productivity growth rates in Australia. For more than 100 years we have been a laggard; now there is evidence to suggest we are performing relatively better than other developed economies in raising productivity levels. There are a number of observations which I would like to make here and which I offer up in the interest of provoking further discussion. The first observation I would make — and this is a personal observation — is that periods of strong productivity growth will generally correspond to periods of good economic governance.

This would generally embrace the following elements: microeconomic stability, removal of regulatory impediments in product, capital and labour markets; institutional settings to promote efficient operations of capital, labour and product markets; and maintenance of appropriate infrastructure, including human capital. A review of recent economic settings in Australia suggests at least to me that there has been an improvement in each of these areas in the first half of the 1990s compared to earlier decades. After two decades of relatively high levels of inflation, inflation in the first half of the 1990s has been very low. Governance, both state and Commonwealth, have generally moved to repair budget deficits. Real interest rates are at the lowest levels for decades. All these factors are very strong positives for capital formation.

There has been a strong deregulatory thrust at both state and Commonwealth level and this is contributing to improved efficiency in a wide range of industries, particularly in the non-traded sector. There has also been a lift in competition in product markets due to tariff reductions and the national competition reforms. As we watch the events in East Asia unfold, it strikes me that one factor that stands Australia in good stead in terms of maintaining strong productivity growth is the strength of its institutional settings with the notable exception, I think, of our labour market institutions. It may well be that this is a factor that would stand out more when international comparisons of productivity growth are made. Let me give a practical example of how better governance is contributing to the higher rates of productivity growth. Since the early 1980s there are a number of developments which all would have encouraged in my view, greater productive investment in Australia.

First, we saw the implementation of the capital market reforms following on from the Campbell report (Committee of Inquiry into the Australian Financial System 1981) which resulted in the use of market rates of interest in Australia to allocate capital. Second, while the tax system continues to be a source of bias affecting decisions between different asset classes, these biases are much less pronounced in a period of low inflation than was the case in the 1970s and 1980s. Third, introduction of the dividend imputation system in the mid 1980s would also have encouraged a shift to more productive investments . Finally, the asset-price boom and bust of the late 1980s may have resulted in greater focus by investors and lending institutions on the sustainable earnings potential of projects, rather than on the market value of assets, though opinions vary on this.

If one accepts that good governance or at least a shift to better governance, has been the main factor responsible for the lift in productivity performance in Australia, it seems to me that Dowrick has set himself a very difficult task in seeking to explain the components of productivity growth, both in Australia and overseas. I fear I may have added to the complexity of his task by suggesting a much wider range of variables that might warrant investigation. The second observation I would like to make is that notwithstanding that productivity growth in Australia has picked up, Australia lags in levels of labour and capital productivity, most other OECD countries by a considerable margin.

One only needs to look at our tax system, our transport system, our health system and the flexibility of the labour market to know that there are considerable structural weaknesses in our economic system that remain to be addressed. Comparisons with other countries have an important role to play in determining why other countries are so far ahead and what we need to focus on to do better. I began my remarks by saying that it was a common refrain by economists that we need to boost productivity levels in Australia to improve growth and raise living standards. Papers such as the one provided by Steve Dowrick are important in helping us focus on those issues we need to address to achieve this. The paper today offers confirmation of other work that there has been a change in the trend rates of productivity growth in the first half of the 1990s that moves us from lagging to leading other developed nations. I suspect, however, that the explanation for this is somewhat more complicated than the several variables which have been used to seek to explain this in the paper. I would like to encourage further consideration of this interesting and important topic.

## References

Committee of Inquiry into the Australian Financial System 1981, Australian Financial System: Final Report of the Committee of Inquiry, AGPS, Canberra.

Industry Commission 1997, *Assessing Australia's Productivity Performance*, Research Paper, AGPS, Canberra.

Maddison, A. 1995, *Monitoring the World Economy 1820–1989*, OECD, Paris.

## General discussion

The general discussion focussed on the following issues:

- the relationship between multifactor productivity growth and employment growth;
- education and the quality of labour;
- the composition of capital;
- implications of changing wage setting procedures; and
- immigration.

### Productivity growth and employment growth

One participant drew the workshop’s attention to the negative correlation between multifactor productivity growth and employment growth. It was observed that in the late 1980s, Australia had very strong employment growth and weak multifactor productivity growth. This pattern had changed by the early 1990s when Australia had relatively weak employment growth and strong multifactor productivity growth. An explanation proffered for this result focussed on the link between real wages and the average quality of employees. In the 1980s, there was basically no growth in real wages, allowing for rapid employment growth. However, if the average quality of newly employed workers was lower than the average quality of the existing workers, the average quality of the workforce would decline. Difficulties in controlling for quality when measuring effective labour inputs meant that this decline in average employee quality translated into lower labour productivity growth. In the 1990s, we may be seeing the reverse of this process. Real wages have increased at an average annual rate of 1.75 per cent per annum. This has retarded employment growth, improved labour productivity and helped raise measured multifactor productivity growth.

In response, Dowrick agreed that the negative relationship between employment and productivity growth was a puzzle. He suggested that information on workforce skill levels could help resolve the puzzle. He also suggested that with real wages and productivity rising at roughly the same rates, returns on investment should also rise. Normally this would lead to growth in investment activity which does not seem to have occurred. Thus, there appears to be a remaining puzzle in the analysis that could not be directly explained by changes in the average skill level of the workforce.

## Education and the quality of labour

It was observed that the way in which education is measured and incorporated into an empirical study can potentially have significant effects on the study's outcome. In particular, the model presented in the session measured human capital as an input (ie as average years of schooling) whereas measures of human capital based on educational achievement are more likely to reflect human capital accumulation. It was also noted that most skill acquisition occurs in an unobservable fashion, such as on-the-job training. For a full understanding of the determinants of multifactor productivity growth, it is necessary to understand the interaction between skilled workers, learning-by-doing and the successful introduction of new technology and new ideas to a workplace.

For an investigation of these links, the workshop was referred to the work of Rick Hannushek from the University of Rochester. This work has involved the assembly of a very large cross-country time-series data base including information on literacy and numeracy. Analysis using this new data base suggests that the introduction of education quality measures into the analysis has a substantial effect on results. On the other hand, it was observed that there is a large body of studies examining education and growth. Some more sophisticated empirical studies are suggesting a shift in the balance of opinion that favours a smaller contribution of eduction to human capital accumulation.

Overall, explaining the links between education, human capital accumulation and growth requires a more careful examination of the underlying data. In this context, concern was expressed about the assumption that output elasticities matched factor shares. This concern was that output elasticities are often one of the parameters productivity and growth studies are trying to explain. There was also the suggestion that the results may be sensitive to the assumed lag structure adopted.

## The composition of capital

In response to the emphasis placed on the quality and composition of labour, it was pointed out that the quality and composition of capital were also important. In particular, a lot of studies introduced a downward bias in the growth rate of capital stock, especially when the introduction of high technology capital was involved. This occurred due to the use of inappropriate price indices to deflate the nominal value of capital stock. There are important quality and composition of capital issues that need to be untangled to evaluate measures of capital stock growth.

### Implications of changing wage setting procedures

There was the suggestion that the shift in the mid 1980s, from an indexation based wage-setting system to one based on productivity may have affected productivity growth. Under the current system, real wage changes tend to be linked to productivity growth. One way in which firms can fund wage rises is to dismiss less productive workers. This in turn leads to an increase in the average productivity of such firms. Standard models for the analysis of productivity growth tend not to include direct measures of the effects of institutional changes. This limits the applicability of these models in times of institutional change.

### Immigration

A view was expressed that, while not a major determinant, immigration may have affected productivity growth by altering the composition of capital. The standard argument employed in the 1970s and 1980s was that immigration both diverted capital from productive to social infrastructure activities, and caused a shift from capital deepening to capital widening. It was hypothesised that in more recent times the reverse has occurred, due to lower rates of immigration and population growth. This observation underlined the need to look at capital series used in productivity analyses more closely.

# 6 MICROECONOMIC REFORM: THE NEW ZEALAND EXPERIENCE

*Brian Easton*

## Prologue

This being the first occasion which I have visited the Australian National University since the death of Professor Fred Gruen, may I briefly pay him a tribute. When we first met, Fred was suspicious of my approach, thinking I was anti-market. Over some long discussions he came to recognise I have a deep Marshallian respect for the market, even though we might not always agree on the details of policy. I would have appreciated a continuation of our intermittent dialogue with his response to this paper. It would have been thoughtful and shrewd. I would have responded in my revision, each of us shifting our position in the light of analysis and facts. I am sorry he is not here, except in spirit.

## 6.1 Introduction

Economic reform in New Zealand has been unusually comprehensive and thorough. For the scientist it provides a test of the theory which underpinned the reforms. The overt theory was essentially that which is known in Australia as 'economic rationalism' — the consistent application of modern neoclassical market theory and the new institutional economics. At the microeconomic policy level this has been the withdrawal of government interventions which preferred one firm, industry, or sector (relative to others), in favour of market regulation of economic activity. Thus, import licenses have been abandoned, tariff levels steadily reduced, subsidies and tax incentives withdrawn, the tax regime made more uniform with exemptions barriers to entry eradicated, corporatisation and privatisation of government trading activities, and greater reliance on competition law.[1] There remain some (much lower) tariffs, a few special taxes, occasional interventions, and so on. Nevertheless the extent of the microeconomic reforms is such that they become a test of the theory which underpins them.

However, testing the theory raises the difficulty that the reforms are so comprehensive, it is not possible to discuss all the issues in a single paper. This paper therefore concentrates upon the productivity implications, focusing on the

[1] For details of the scope of the reforms see Silverstone *et al.* (1996), especially Chapter 1.

theoretical proposition that greater use of market regulation ought to lead to productivity improvement, that is, increased output per unit of input in the economy as a whole.

This means the paper is not primarily about whether the reforms have generated more output — whether they increased the growth rate of GDP. However, it is useful to begin with the macroeconomy to provide a context for assessing microeconomic performance

## 6.2 Macroeconomic performance

It is becoming increasingly accepted in New Zealand that the reforms which began in 1984 have not markedly increased the growth rate of GDP, nor of economic performance generally (other than price stability). Table 6.1 gives a comparison of the changes in major macroeconomic indicators for New Zealand, Australia and the OECD since 1984. Except for a reduction in the rate of inflation, the New Zealand record is disappointing.

It is, of course, possible to select a few indicators for a few years to argue that there has been an improvement in the underlying growth rate. In particular, a strong cyclical upswing in the mid 1990s when volume GDP did increase by 6.2 per cent in the year to March 1994 and 5.5 per cent in the year to March 1995. This upswing, almost comparable in strength to the 1984 and 1985 one which preceded the reforms (and perhaps a little longer), was heralded as a shift into a high growth sustainable economy. For instance, Hall (1996) wrote, '...it is suggested that on balance there is scope for cautious optimism on the sustainability of New Zealand's recently improved economic growth'. Yet it was evident at the time to careful observers that the upswing was a response to the long five-year contraction which preceded it. Not surprisingly, annual GDP growth rates after 1994 have been more subdued — 3.1 per cent to March 1996, 2.4 per cent to March 1997, and around 2 per cent to March 1998. In summary the New Zealand economy has still not caught up with the OECD track since 1984, even though it was close to it from 1978 to 1984 (Figure 6.1).

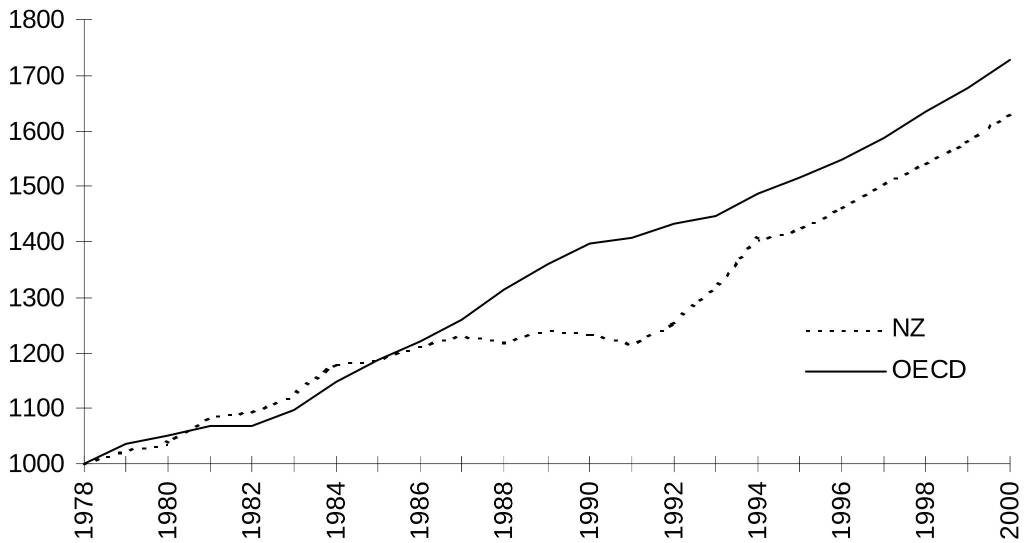
While there is always disagreement about future growth rates, the consensus seems to be that New Zealand's future GDP growth rate is about the same as the OECD's, or perhaps a fraction lower. Hall's 'cautious optimism' (published after the growth boom had ceased) would now be considered optimistic rather than cautious.

## Table 6.1: **Economic performance, New Zealand, Australia and the OECD,[a] 1985 to 1996**

| | *New Zealand*[b] | *Australia* | *OECD* |
|---|---|---|---|
| **Inflation —** Private consumption deflator (% p.a.) | | | |
| 1985 | 17.2 | 6.9 | 6.7 |
| 1996 | 2.5 | 1.8 | 4.5 |
| Average (1985–1996) | 6.0 | 4.8 | 5.6 |
| **Inflation —** GDP Deflator (% p.a.) | | | |
| Average (1985–1996) | 5.3 | 4.1 | 5.6 |
| **Unemployment** (% of labour force) | | | |
| 1986 | 4.0 | 8.0 | 10.5 |
| 1996 | 6.1 | 8.5 | 11.1[c] |
| Average (1986–1996) | 7.2 | 8.6 | 9.9 |
| **Employment growth** (% p.a.) | | | |
| Average (1985–1996) | 0.8 | 2.0 | 1.1 |
| **GDP volume growth** (% p.a.) | | | |
| Average (1985–1996) | 1.5 | 3.1 | 2.6 |
| **Labour productivity growth** (% p.a.) | | | |
| Average (1985–1996) | 0.7 | 1.1 | 1.5 |
| **Export price change** (% p.a.) | | | |
| Average (1985–1996) | 1.8 | 1.5 | 1.3 |
| **Import price change** (% p.a.) | | | |
| Average (1985–1996) | 0.6 | 1.4 | 0.7 |
| **Terms of trade change** (% p.a.) | | | |
| Average (1985–1996) | 1.2 | 0.1 | 0.6 |
| **Export volume growth** (% p.a.) | | | |
| Average (1985–1996) | 4.3 | 7.3 | 6.7 |
| **Import volume growth** (% p.a.) | | | |
| Average (1985–1996) | 5.1 | 6.7 | 6.8 |
| **Current account deficit** (% GDP) | | | |
| Average (1985–1996) | 3.2 | 4.4 | 0.3 |

a The OECD consists of 28 economies.
b The New Zealand figures do not always correspond to the official figures, but are used here for consistency.
c Estimate.
*Source*: OECD (1997).

Figure 6.1: **Output growth, New Zealand and the OECD average, 1978 to 2000** (indexes 1978=1000)




*Source*: OECD (1997).

So, it would seem that after nine years of stagnation beginning in late 1985, New Zealand is back on a modest growth trajectory, not unlike that which preceded 1984, but lower and obscured by a strong cycle. Even this may prove optimistic for the consensus sees a continuing deterioration in the current account deficit and a rising foreign debt to GDP ratio. This would require ongoing overseas financial investment which may not occur to the extent assumed in the forecasts. (More is said about the prognosis after 1997). There are a number of explanations for this poor performance. Among the most vigorously argued are:

- the reforms are fundamentally flawed (eg Kelsey 1996);
- the promise that the benefits of the reforms are yet to come. This has been a constant theme of the pro-reformers since 1985, with a constant shifting into the future of the date at which any benefits will become apparent. Perhaps the best response is that of historian G. M. Trevelyn who in 1945 said: ‘[i]t is still too early to form a final judgement on the French Revolution’;
- the economic record would have been even worse without the reforms. Unfortunately, it is not easy to agree on an appropriate counterfactual scenario. After all, Muldoon indicated in 1984 that he was fundamentally

changing policy by eliminating export subsidies. Even so Evans *et al.* (1996) and when correct data is used Dalziel (1997), show that the New Zealand economy grew more slowly after the reforms than before. Contrawise, before the reforms and hence lacking the benefits of hindsight, Bryan Philpott (1985, 1990) projected an economic track on the then existing policies which was better than the actual outcome.

- the international environment. Any counterfactual scenario needs to take into account the international environment. The approach of Evans *et al.* (1996) involves the pretence that external events have no impact on a small multi-sectoral open economy such as New Zealand. In fact, the terms of trade deterioration in the early 1980s coincided with higher world interest rates (New Zealand being a debtor nation) (Easton 1997a).[2] Importantly, the third oil shock of the mid 1980s when the oil price fell, occurred just as New Zealand increased its self-sufficiency in hydrocarbons. (The issue is further discussed below in regard to the Major Projects.) Note however, that New Zealand experienced a terms of trade lift in the early 1990s, which would have contributed to the cyclical boom shortly after, and so to the prospects of the late 1990s. In any case as Easton and Gerritsen (1995) have noted, the Australian terms of trade seem to have suffered more in the 1980s and yet the Australian economy did better (see also Table 6.1);
- the experience of disinflation, as New Zealand's inflation rate came down from one of the highest in the OECD in the 1980s to one of the lowest in the 1990s. The cost of this disinflation was a loss of output (Hall 1996);
- an overvalued exchange rate (especially if measured net of subsidies and protection) compared to the pre-1984 real exchange rate (which was considered overvalued at the time) inhibited the growth of the tradeable sector which is the centre of growth in a small open economy such as New Zealand (Easton 1997a).

The last two explanations may seem two aspects of the same phenomenon, since the main mechanism for disinflation was the over-valued exchange rate. However, the disinflation explanation (fifth dot point) sees the experience as a transitional one, whereas the inhibition of the tradeable sector explanation (sixth dot point) argues there has been an hysteresis effect (Mayes 1996). In which

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[2] Easton (1997a) is based on a major research program, which is cited in the book. For a post-publication report on the macroeconomic issues see Easton (1997d).

case there is likely to be long-term damage to the tradeable sector which will affect the performance in the long term after the disinflation is over.[3]

While obviously the writer of this paper has a view on the relative importance of the various explanations, it is unnecessary to pursue them for this paper. However there is a seventh point which overhangs any paper about productivity performance:

- the poor economic performance occurred because there were not the expected gains in productivity.

The paper returns to it in the conclusion.

## 6.3 The productivity measure

This paper measures labour productivity by output per unit of labour input, rather than by total factor productivity. Output is measured as constant price value added (GDP for aggregate output) unless otherwise stated, while the labour input is typically worker years. The paper will refer to work using multifactor productivity (MFP), but for reasons that will become apparent it is appropriate to give separate consideration to the capital input.[4] The paper also largely analyses aggregate productivity, but there is a section on productivity at the sub-aggregate level.

Two series on labour productivity are considered. An annual series from March year 1978 to 1996, based on Philpott (1996), is shown in Figure 6.2. It is the longest, consistent, reasonably up to date, series available. Basically, it suggests a constant secular trend, with a little noise perhaps due to contemporary events such as the business cycle and policy changes. Figure 6.3 shows a shorter quarterly series from June 1985 to September 1997. This series suggests a more complicated pattern of growth than the relatively smooth trend shown in Figure 6.2.

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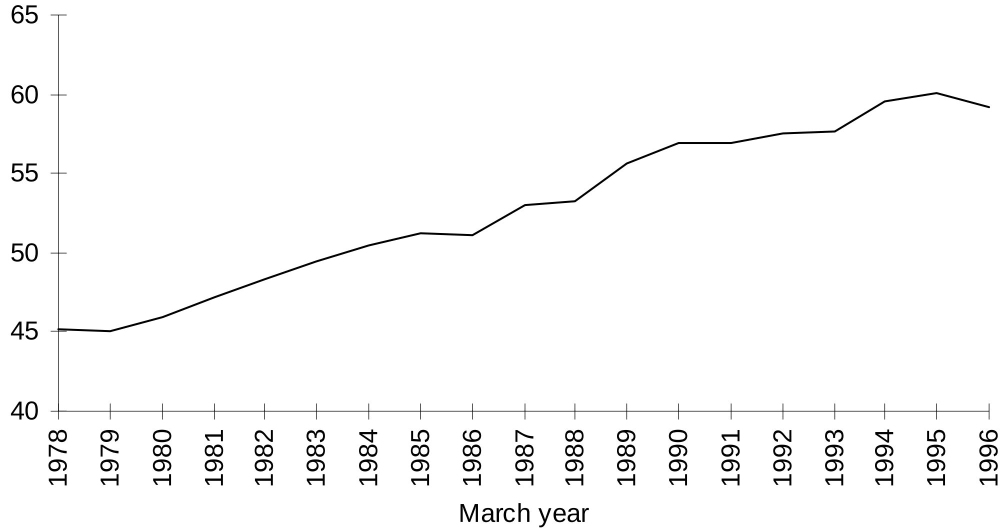
3 An extension of the fifth point, although not fundamental to the argument, is that the anti-inflation stance will continue to depend upon an overvalued exchange rate and high real interest rates which together will continue to inhibit growth. This is not necessarily an argument that growth requires inflation: rather that the policies to control inflation in New Zealand have affected — and will continue to affect — economic growth.

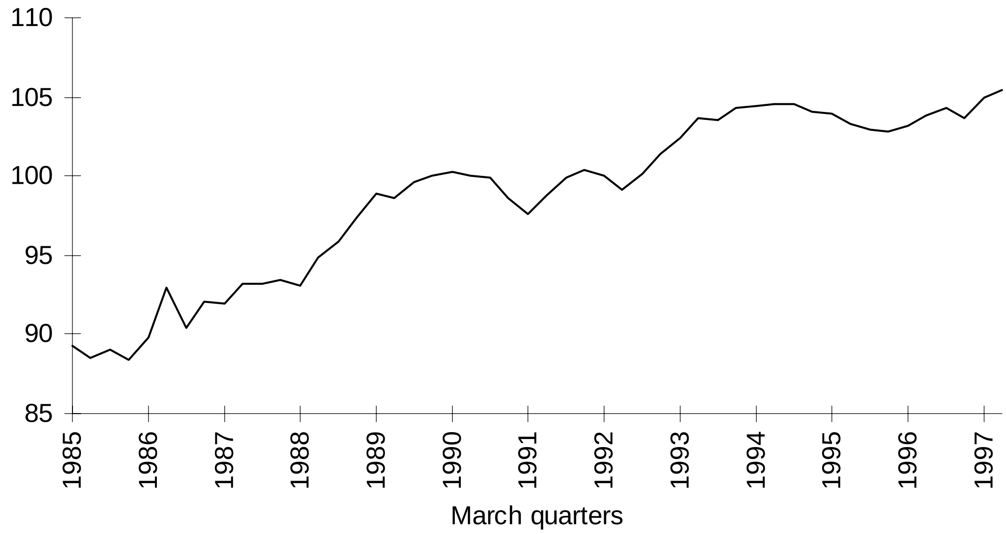
4 The term multifactor productivity (MFP) is sometimes used interchangeably with total factor productivity (TFP). The later term is commonly used in New Zealand productivity studies.

Figure 6.2: **Average labour productivity,[a] New Zealand (annual series), 1978 to 1996** (constant 1991-92 prices, thousand)




a Constant price GDP divided by full time employed labour force equivalents.
*Source*: Philpott (1996).

Figure 6.3: **Average labour productivity,[a] New Zealand (quarterly series), 1986 to 1997** (index March 1990=100)




a Constant price GDP divided by full time employed labour force equivalents.
*Source*: Statistics New Zealand.

## 6.4 The course of productivity

Table 6.1 shows that New Zealand has had a low annual increase in labour productivity compared to Australia and the OECD for the period 1985 to 1996. The increase of 0.7 per cent per annum is less than half of the OECD average for the period, and about two thirds of the Australian experience. (Note this includes the boom years of the early 1990s.)

Table 6.2 gives comparable data to Table 6.1 but for a slightly smaller number of OECD countries) for the period 1978 to 1985. Over that period, the New Zealand labour productivity growth rate was 1.9 per cent per annum — about the same as (or slightly higher) than Australia and markedly higher than the rest of the OECD.[5] This may be partly a cyclical effect, for 1985 is the top of the New Zealand cycle while 1978 was a trough. Nevertheless, the data raises questions about those who argue, often without reference to the data, that New Zealand was doing poorly before 1984 (Figure 6.1). In fact the story is a complicated one, including major unfavourable external shocks, especially a secular downward drop in the terms of trade in 1966. New Zealand's volume GDP growth rate was comparable to the rest of the OECD before 1966 (Easton 1997a).

A number of studies looking at earlier productivity growth (Marks 1983 (labour), Orr 1990, Philpott 1996 (TFP), Easton (1997a) found no evidence for a change in the secular trend (after cyclical adjustment) from the late 1950s and early 1980s. This is inconsistent with the common finding of some sort of OECD climacteric in the 1970s.[6] The growth rate was about the same as, perhaps fractionally below, the OECD average over the period (Easton 1997a), consistent with the shorter (and not-cyclically adjusted) record in Table 6.2.

One might predict that the microeconomic consequence of the various reforms was to increase the rate of productivity growth (even if the macroeconomic outcome was poor). In fact, as Table 6.1 indicates (and discernible in Figure 6.3), there may have been an aggregate productivity growth slowdown in the late 1980s. Possibly, New Zealand's productivity climacteric took place a

5 The data has not been projected further back, because there is a severe problem over the GDP estimate for 1977–78 (Easton 1997a).

6 Climacteric is used in this context to mean a distinct slowdown in the longer-term rate of productivity growth.

decade later than the OECD, although the paper by Dowrick in this volume warns about coming to too hasty conclusions.[7]

This does not necessarily mean that the microeconomic reforms have had no impact on productivity. Microeconomic studies show some (limited) effects.

Table 6.2: **Economic performance for New Zealand, Australia and the OECD, 1978 to 1985**

| | *New Zealand*[a] | *Australia* | *OECD*[b] |
|---|---|---|---|
| **Inflation** — Private consumption deflator (% p.a.) | | | |
| Average (1978–1985) | 13.2 | 9.0 | 7.4 |
| **Inflation —** GDP deflator (% p.a.) | | | |
| Average (1978–1985) | 12.5 | 9.2 | 7.2 |
| **Employment growth** (% p.a.) | | | |
| Average (1978–1985) | 1.1 | 1.5 | 0.8 |
| **GDP — volume growth** (% p.a.) | | | |
| Average (1978–1985) | 3.0 | 3.2 | 2.4 |
| **Labour productivity growth** (% p.a.) | | | |
| Average (1978–1985) | 1.9 | 1.7 | 1.6 |
| **Export volume growth** (% p.a.) | | | |
| Average (1978–1985) | 5.2 | 5.4 | 5.1 |
| **Import volume growth** (% p.a.) | | | |
| Average (1978–1985) | 5.3 | 5.4 | 4.2 |
| **Current account deficit** (% GDP) | | | |
| Average (1978–1985) | 5.8 | 4.0 | 0.5 |

a OECD estimates for New Zealand do not always correspond to the official figures, but are used here for consistency.

b The OECD consists of 24 economies.

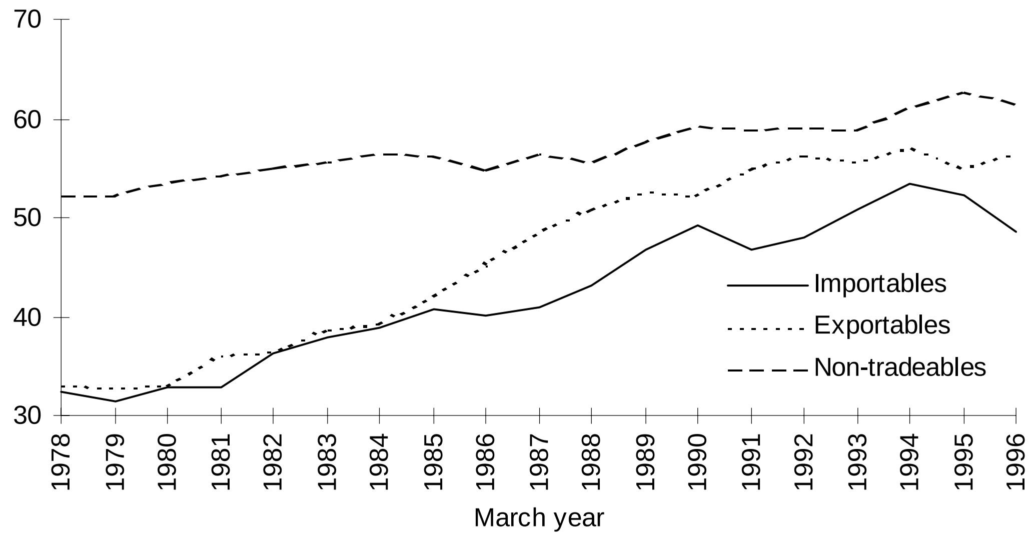
*Source*: OECD (1993).

7 A structural factor, throughout the OECD, is the shift to the service sector which tends to depress aggregate labour productivity. Again this has not been properly investigated in New Zealand.

## 6.5 Sectoral studies

Philpott (1996) disaggregated his data (on which Figures 6.2 and 6.3 were based) into three sectors: exportables, importables and non-tradeable sectors (Figure 6.4).[8] Each of the three sectors shows a secular growth in productivity, with different trends. Non-tradeables grow steadily but slowly, there is a clear cyclical swing in the rapidly growing importables, and there is a discernible deceleration in the rapid exportable productivity growth in the late 1980s (and less evidently in the importable sector).

Figure 6.4: **Average labour productivity,[a] New Zealand trade sectors, 1978 to 1997** (constant 1991-92 prices, thousand)




a Constant price GDP divided by full time employed labour force equivalents.
*Source*: Philpott (1996).

The importable productivity record is particularly surprising. From the mid-1980s to the 1990s, protection was systematically withdrawn from the importables sector. One would predict that this would increase sectoral productivity as businesses whose low productivity had been sheltered behind

8 The non-tradeable sector has the highest level of labour productivity because it includes capital intensive electricity and home ownership.

import controls and high tariffs either closed down or introduced higher productivity methods following exposure to overseas competition.[9]

But there is no sign of significant productivity acceleration in the figure associated with removal of protection. Reasons why the effect may not be evident include:

- the gains may not be great. In any case there has been a degree of trade liberalisation since the late 1970s — or even earlier — so that some of the productivity gains from trade were occurring from then. While the trade liberalisation may have been timid in scope in the 1970s it often involved the most anomalous interventions, whereas the later reductions while more dramatic may have resulted in smaller productivity gains;
- the business cycle may obscure the underlying change in trend; and
- there is no simple connection between labour productivity and protection. For instance, while the elimination of protection may affect most the poor productivity plant in each industry, it is conceivable that the structure of protection could be such that the protected ones were high productivity compared to those that were unprotected.

A more dramatic productivity change occurred in those industries Philpott categorised as ‘restructured’ — mining, forestry, electricity, and communications. These were industries which were largely government owned in 1984, and experienced substantial corporatisation and privatisation. It is evident from Figure 6.5 that the sectors experienced a substantial subsequent increase in their productivity growth, although this boost seems to have stopped after 1992–93, and the productivity trend seems to have returned to its pre-1984 trend.

However the restructured sectors contributed only 10.3 per cent to GDP in 1997–98 rising to 15.7 per cent in 1995–96, so their substantial productivity gain did not impact greatly on aggregate economic performance. Had the restructured productivity grown after 1987–88 as it had before that date, average labour productivity for the whole economy would then have been only 2.8 per cent higher in 1995–96 (assuming that the sector’s output would have grown at the same rate without the additional productivity growth). On this measure the corporatisation and privatisation program added a fraction under

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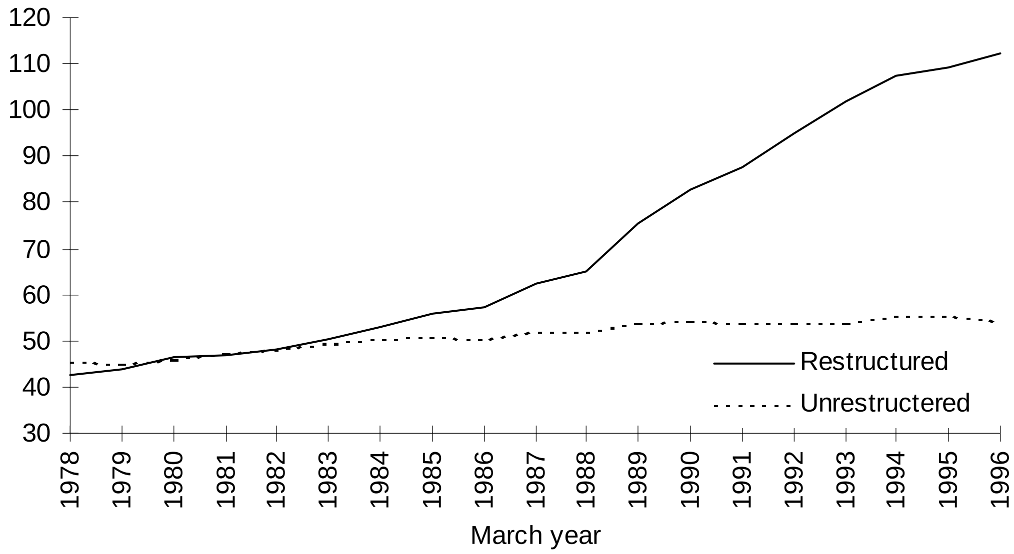
9 This is not discriminating between the productivity change which occurs when there is a shift along the production curve from where there is a shift of the production curve. The rhetoric is often in terms of the latter, although clearly the former happens at the industrial level, and may well be beneficial if the released resources move to higher productivity activities — rather than become unemployed.

0.5 percentage points to annual aggregate productivity growth between 1987–88 and 1993–94.

Figure 6.5: **Average labour productivity,[a] New Zealand industry groups, 1978 to 1996** (constant 1991-92 prices, thousand)

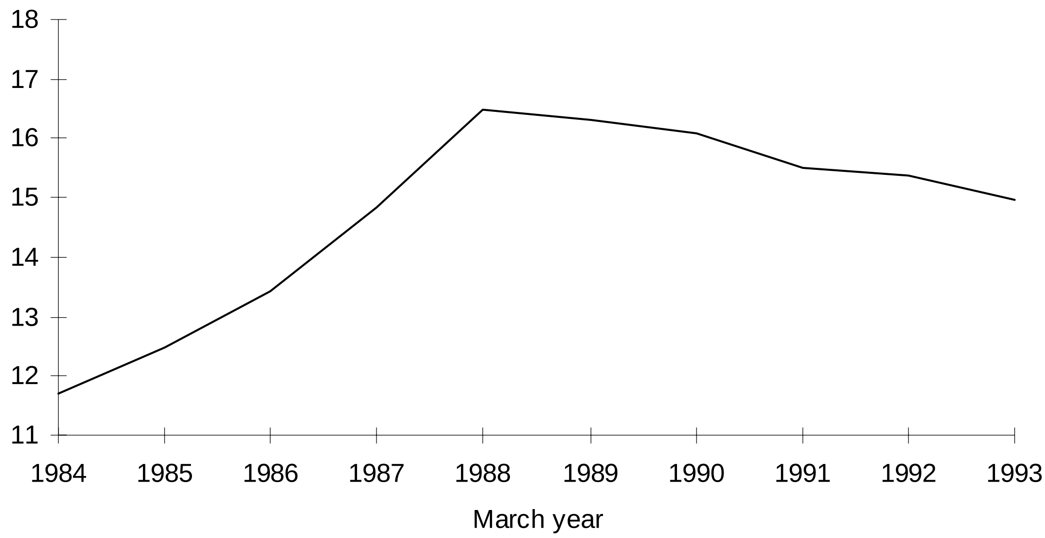



a Constant price GDP divided by full time employed labour force equivalents.
*Source*: Philpott (1996).

A caveat here is that some of the apparent gains may have occurred by outsourcing to other industries. Contracting out, for instance, cleaning and financial service provision may have diminished the net labour (and capital) inputs in an industry without affecting the gross output of the economy. Thus some of the productivity gains may be a statistical illusion.[10]

[10] de Boer and Evans (1994) use data from a single ex-public sector firm to calculate technical progress. The result is of little value for our purposes, since the study does not begin before the business was corporatised, so we cannot tell whether there is a change in the productivity growth rate as a result of the corporatisation. In any case the method is fatally flawed, because a firm can change its internal productivity measured by the ratio of net output to factor inputs, by outsourcing some low productivity activities, converting a factor input to a goods and services input. To work the method needs to treat goods and services purchased from other firms as an input, which is part of the contribution to gross output.

Figure 6.6: **Financial sector share of GDP, New Zealand, 1984 to 1993** (per cent of GDP at constant 1991–92 prices)




*Source*: Statistics New Zealand.

An example of this growth of specialisation from outsourcing may be evident in the financial industry. Figure 6.6 shows that in the mid 1980s the contribution of the financial sector to GDP rose sharply. After a period of growth, the sector contribution to GDP flattens out at some 25 per cent above earlier levels. Why is the economy sustaining so much additional financial activity? One explanation is the sector is doing work which was once in-house to other sectors (including activities which were once government responsibilities). On the other hand, it is possible that resources are being used in the financial sector with little benefit to the economy (as in late 1987) which would lower aggregate productivity.

## 6.6 Industry studies

This section deals only briefly with industry studies because they involve the inherent difficulty of the New Zealand economy that it is so small that single events, trivial in a larger economy can affect the data in a major way. This is not to dismiss the technical quality of the work, so much as caution its practical interpretation.

Färe, Grosskopf, and Margaritis (1996) calculated indices of the (Malmquist) technical change, efficiency change, and scale change for 20 industries from 1973 to 1994. However, in virtually every industry massive structural changes occurred over the period (Easton 1997a). Perhaps the statistics are but summaries of very complicated changes.

Philpott (1993) observed that the apparent gains in the agriculture sector in the late 1980s were due to gains in the horticultural sub-industry, as the result of a major (and heavily subsidised) planting program which occurred in the 1970s. The same problem of long lead times for capital investments also affects mining and quarrying, paper products and printing, chemical and chemical products, basic metals, and electricity, water and gas. Their 1980s productivity was influenced by policies of government support in the 1970s. Other special cases include: agriculture affected by the weather cycle, fishing affected by the Exclusive Economic Zone (EEZ), forestry affected by plantings made three decades earlier, food processing affected by higher international quality standards.

Another problem is that in 16 (out of 20) industries in the Fare *et al.* study, a rise in technical change in the mid 1980s is associated with a fall in the scale index, which suggests some statistical interdependence between the two measures. Also, the efficiency index for eight industries showed some deterioration in the mid 1980s.

It is true that 18 industries show a sharp increase in technological productivity in the mid 1980s, but we knew that already from Figure 6.2. Sadly, there are no new insights from the study. Nor do the study's authors draw any significant conclusions, merely suggesting that 'the economic reforms had an overall positive impact on the productivity growth of the New Zealand market sector. This impact has, however, been quite uneven...' (Fare *et al.* pp. 96–7). But they do not estimate the impact, and in fact the first conclusion is based on a temporal coincidence and does not consider alternative explanations.

Chapple (1994) calculates MFP growth rates from 1972 to 1991. In 8 of the 20 industries, there is a decline in the MFP index between 1984 and 1991 and in a further 2 there is a reduction in its growth rate compared to 1972 to 1984. Färe *et al.* find reductions in their Malmquist index between 1984 to 1991 in 9 industries, and a further 3 experience decelerations (Table 6.3).

## 6.7 The labour market

The impact of the 1991 Employment Contracts Act (ECA) on productivity has been a matter of some interest, and a little research. Kasper advised that: '[w]e can conclude that the Employment Contracts Act has substantially enhanced the productivity of labour...' (Kasper 1996, pp. 50-1). However he provided no data. The data he uses to describe GDP and employment growth implied there has been little productivity change since the ECA was introduced, a conclusion consistent with Figure 6.3.[11]

It is true there was a sharp rise in labour productivity in late 1992. This is over a year after the introduction of the ECA and coincides with the cyclical expansion of the mid 1990s, characteristic of the early stage of a cyclical upswing when output gains arise from more intensive use of the existing workforce. Kasper claims that the ECA caused the upswing, but provides no analysis or evidence for his assertion. A more orthodox explanation is that following a long contraction there was a cyclical upswing (in part a consequence of the terms of trade rise of the early 1990s). Although the upswing had come to an end by the time Kasper wrote, he gives no indication why it occurred, whereas treating the experience as a standard New Zealand business cycle, the end was predictable and predicted (Easton 1997a).

One anecdotal source for productivity improvements arising from the ECA is a survey of managers which reports 'increased productivity and operational flexibility and greater training' (NZIER 1996). Since there is no statistical evidence for substantial gains in productivity above the trend of previous years, there are three possibilities to explain this apparently misconceived enthusiasm:

- managers are attributing normal productivity gains to the ECA;
- managers have greater freedom to manage than in the past, because they are less constrained by law and by unions. They assume that these benefits to themselves must result in improved benefits to the firm in greater productivity; and
- management may confuse productivity with labour costs.[12] As Easton (1997b) shows, labour costs relative to labour productivity fell shortly after the introduction of the ECA, but this may be the result of wage restraint facilitated by the ECA (but also may be a cyclical effect).

There may have been small productivity gains. Anecdotes abound. For example, one major industrial site used the new industrial framework to 'buy the book' of workplace rules. However, in total they are not very evident in the aggregate data. Moreover, there is no evidence that they were anything more than one-off.

[11] Kasper cites work by Maloney (1994, 1996) which however does not address productivity, so we need not review it here. Refer to critiques in Easton (1997b, 1997c).

[12] Ian Castles makes this point in his commentary in this publication.

One argument which has not been explored, but offers some promise, is that the lower real-product wage encouraged labour intensive production methods, which would appear as a fall in labour productivity. There is little agreement among New Zealand economists of the significance and size of any real wage effect (Easton 1990), and thus far enthusiasts for the real wage effect have not considered its productivity implications. The Australian productivity growth patterns Dowrick observes (this publication) may be attributable to real wage effects and suggest that a revisiting of the New Zealand data may be worthwhile.

In summary, there is not much evidence from the New Zealand experience that increased labour market ‘flexibility’ generated productivity increases. That is consistent with the overseas experience, for while it is true that the more flexible labour markets of the United States are associated with greater job creation than in Europe, it is equally true that Europe has experienced higher labour productivity growth. (Table 6.3). Part of the resolution of this paradox is that too often the expression ‘flexibility’ is used rhetorically rather than as a careful analytic notion. (Easton 1997a)

This draws attention to one further aspect of the labour market. Suppose New Zealand had had the sort of labour productivity growth that the OECD averaged between 1985 and 1996. Assuming this did not affect the growth of GDP nor labour force participation rates, employment would have been broadly constant over the period, and the unemployment rate would have been over 15 per cent. While there may be dispute over the assumptions, it is indisputable that the labour market performance over the period looked reasonable (if worse than before 1985) in part due to the poor productivity record.

## 6.8 The capital measurement problem

Those interested in the New Zealand economy are indebted to Bryan Philpott for his laborious (and rarely adequately funded) construction of estimates of capital stock which are used, among other purposes, for the MFP estimates (Philpott 1994a, 1994b, 1995, 1996). However, they suffer from a major weakness where market liberalisation is being studied.

Table 6.3: **Average annual growth rates of GNP, employment and labour productivity, United States and Western Europe, 1973 to 1995** (per cent per annum)

| | *GNP* | *Employment* | *Average labour productivity* |
|---|---|---|---|
| **United States of America** | | | |
| 1973–1979 | 2.5 | 2.5 | 1.2 |
| 1979–1985 | 2.0 | 1.3 | 0.0 |
| 1985–1990 | 2.7 | 1.9 | -1.5 |
| 1990–1995 | 2.4 | 1.2 | 0.3 |
| 1973–1995 | 2.4 | 1.8 | 0.6 |
| **OECD – Western Europe** | | | |
| 1973–1979 | 2.7 | 0.7 | 3.3 |
| 1979–1985 | 2.0 | 0.4 | 0.7 |
| 1985–1990 | 3.2 | 1.3 | 2.2 |
| 1990–1995 | 1.7 | 0.0 | 1.0 |
| 1973–1995 | 2.4 | 0.6 | 1.8 |

*Source*: Easton (1997b).

Philpott's capital estimates are based on the cost of installation adjusted for inflation and depreciation using a perpetual inventory method. At any point in time, the values need not reflect the actual market value of the capital. This is especially true following microeconomic reform where, for example, the New Zealand Steel plant at Glenbrook was worth more than $NZ3 billion in the capital stock estimates, but became virtually worthless in market terms following the removal of protection. This massive reduction in the market value of the productive capital of New Zealand applied to most industries where market liberalisation occurred. While the scale of the write-downs elsewhere was generally smaller, the number of plant and processes that were involved means the total magnitude was probably enormous. Some productive capital may have had enhanced value as a consequence of the liberalisation, but almost certainly the devaluations exceeded the revaluations by a large margin.[13]

What is the meaning of MFPs based upon this capital measure? One way of interpreting what happened was that the market liberalisation is a little like a

[13] Chapple (1994) attempted some preliminary estimates to assess the effect of writing down the asset values.

war, in which vast quantities of physical and human capital are destroyed, but continue to be recorded in the capital (and hence MFP) measures. In which case 'post-war' productivity growth could be spectacular, but the available measures conceal it because of this fictitious capital.

Maybe, but that does not assist evaluating the benefits of market liberalisation *per se*, just as we would not support a repeat of a war to obtain the high growth rates of post-war recovery in the 1950s of the devastated countries. The image of war destruction is, of course, not a perfect one, but it is a reminder that much physical and human capital is process specific, and cannot be easily converted to other uses after the removal of protection.[14]

Alternatively, we may think of market liberalisation involving a transition. A relevant question is whether the costs of this transition are offset by the long-run benefits. No one has attempted to carry out a sophisticated evaluation of this for the New Zealand case, perhaps because there is still no compelling evidence for acceleration in productivity or growth.

Another feature of the MFP method is its assumption that capital is fully operational shortly after it is installed. For many big projects — power stations, the major projects (see below), forestry, horticulture, and livestock expansion — the assumption is not true. Lags of up to seven years may be common (more for forests). If there is any bunching of investment, as occurred in the late 1970s and early 1980s, the MFP profile in the mid and late 1980s will be misleading and average labour productivity hard to interpret.

## 6.9 The major projects ('Think Big')

As it happens, I invented the term 'Think Big' in 1980 as a device for rhetorical criticism of the strategy (Easton 1980a). Regrettably the rhetoric still dominates analysis, especially in the arguments which amount to: 'Think Big was the ruin of the New Zealand economy'. Indeed, the term may be used widely for any project which the rhetorician disapproves (including in the agriculture sector). Or it may be applied narrowly to the group of large projects which were precipitated by an energy surplus from the Maui Gas available in the North Island and the overbuilding of hydropower stations in the South Island.

[14] Or for change in relative prices. I use the explanation for the deterioration in New Zealand's economic performance following the terms of trade change of the late 1960s (Easton 1997a).

Even confining to the latter definition, usually labelled ‘Major Projects’ to distinguish them from the rhetoric, there has been surprisingly little sober evaluation.[15] Here is a brief framework:

- New Zealand had a burgeoning energy surplus in the late 1970s, partly through good fortune (the finding of the giant Maui Gas field) and partly forecasting failure (the overbuilding of hydro-stations in the Waitaki and Clutha);
- the energy surplus was absorbed by a number of energy intensive major projects.[16] The alternatives to these projects was (and is) far from clear (other than spilling water and flaring gas);
- some of the projects were known to be inefficient at the time (the ammonia-urea plant, the NZ Steel extension) and dependant on protection for their commercial viability;
- there were severe construction cost over-runs for some (the oil refinery and NZ Steel expansion) but not others (the syngas plant);
- about the time most came on-stream in the mid-1980s the world price of oil fell, so most became unprofitable, an effect that was compounded by the removal of protection. For example, the syngas plant was economic for oil prices as low as $US25, when expectations were they would exceed $US35. It came on-stream when they had fallen to around $US12; and
- it proved that in almost every case, there was some sort of government guarantee, which meant that the down-side risk was borne by the public either fiscally or in higher prices when it eventuated.[17]

The last point involved an unforgivable mistake, although the point was not made in the ‘Think Big’ debate of the early 1980s. In direct productivity terms, the big costs were the cost over-runs (but recall this did not happen for every one) and the third oil price shock (which did).

Hazeldine and Murphy (1996) suggest that the effect of having the Major Projects was significant but not as large as other effects, and certainly not as large as the rhetoric would have it.[18] Regrettably, the paper does not pay enough attention to distinguishing whether the projects were fatally flawed in

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15 But see Easton (1997a) and Hazeldine and Murphy (1996).

16 For a list see Easton (1997a).

17 Including from a tax impost.

18 The rhetoric also over-emphasises the contribution of the Major Projects to the rise in public debt.

the context of what was known in the early 1980s when they were initiated, or whether cost over-runs and the third oil price shock ruined them.

## 6.10 Fiscal issues

The current debate in New Zealand on the allocative and growth effects of tax is confused and uninspiring. The conventional wisdom is that the tax system is now more efficient as a result of the introduction of the comprehensive valued added tax, goods and services tax (GST), the removal of (often erratic) exemptions and discriminations, and the lowering of top tax rates (although Effective Marginal Tax Rates (EMTRs) remain high on the poor). However, there is a lobby that argues that New Zealand is over taxed. In doing so, they generally conclude that the burden of taxation has risen since the reforms. This is largely because of peculiar assumptions and methods. For instance, Diewert and Lawrence (1994) found the unit burden of taxation more than doubled during the 1980s, but this proves to be an artefact of the assumption that all unemployment was caused by tax wedges. Since unemployment had risen in the 1980s, the alleged burden had also. Scully (1996) regressed a tax rate on a transformation of itself and claimed the estimated parameter indicates the optimal tax rate.

## 6.11 Measurement issues

Kasper (1996) suggests: '[s]ome knowledgeable observers believe that employment statistics under-report employment growth since the ECA'. He does not, however, say who these people are, nor what were their claims to be knowledgeable. He is probably not correct, but if he were, the productivity record would be even worse.

A more serious problem is that the labour measure may be problematic if there were significant changes in labour force composition, or if hours of work changed dramatically. To my knowledge, no one has investigated these issues post 1984.[19]

I looked at the accuracy of the volume GDP statistics, my attention having been drawn to the apparent deterioration in labour productivity in much of the service industry (Marks 1983). They appear to be slightly downward biased, by perhaps 3 per cent per annum, compared to best OECD practice, largely arising from the difficulties of measuring service sector output Easton (1997a).

19 For earlier period studies, see Easton (1997a).

Although there have been improvements in GDP measurement, the statisticians involved tell me they are doubtful they have markedly overcome the problems, partly because any improvements are offset by increasing service sector complexity.

While this measurement problem may have led to underestimating New Zealand's economic performance compared to the rest of the OECD, the effect is very small, and not crucial for the story (Easton 1997a). It makes no contribution to explaining why there was no acceleration in productivity after 1984 compared to the rate before.

A study which looked at five pre-1984 market liberalisation's — foreign exchange market, the freight haulage industry, the meat processing industry, imports of canned beer, and bread price controls — suggested however, that the measurement problem may be even more complicated than the issues discussed above (Bollard and Easton 1985, Easton 1997a). There was little evidence of simple efficiency gains, although this may have been the consequence of the study coming too soon after the liberalisations, and inadequacies in the databases. It found price reductions, but typically these were the consequence of the ending of cross-subsidisations with concomitant price increases elsewhere.

However, the study also found increases in the quality of the products, and the choice of consumers, which seemed to be a result of liberalisation. For instance, bread price controls seemed to inhibit the introduction of new types of bread (eg hot bread and French bread shops). Such quality changes are notoriously hard to incorporate into price and volume indices, and increased choice is even more difficult. One might argue that the liberalisation often resulted in the New Zealand quality and choice catching up (and sometimes exceeding) other OECD countries, but this is not properly reflected in the measures.

While one may be comfortable with such a conclusion, there are caveats. The first is that while there may have been such improvements to purchasers, many people were worse off over the period of liberalisation, because of rising unemployment or reduced employment, or because of falling measured real incomes.[20] However, it may be factors other than microeconomic liberalisation which made them worse off.

20 Only the top 10 per cent of households have had increases in real incomes over the period, the second decile largely stagnated and the remainder experienced falling incomes Easton (1996).

Second, it seems likely in some areas, especially in the government sector with spending under severe downward pressure, that there has been a widespread deterioration in quality of service.

Table 6.4: **Views of quality of service changes by main income of household,[a] New Zealand, 1993** (net percentage of respondents*)*

| | | *Is service 'Excellent' or 'Only fair' or "Poor"?* | | | |
|---|---|---|---|---|---|
| *Main bread winner income* | *Has service Improved or Worsened?* | *Airlines* | *Banks* | *Lawyers* | *Taxis* |
| <$15000 (20%) | 14 | 7 | -10 | -21 | -24 |
| $15–25000 (21%) | 19 | 4 | -20 | -44 | -28 |
| $25–$35000 (21%) | 20 | 1 | -14 | -48 | -40 |
| $35–$45000 (15%) | 28 | 15 | -3 | -26 | -34 |
| $45–55000 (5%) | 35 | 33 | -5 | -50 | -68 |
| >$55000 (10%) | 52 | 30 | -10 | -31 | -40 |
| All | 27 | 10 | -11 | -35 | -44 |

a Net changes in quality are calculated as percentage of total less 'unsure'.
*Source*: Insight Research New Zealand Ltd, Supplementary Tables, August 1993, with permission.

The third caveat is the most troubling. A one-off 1993 survey by Insight Research New Zealand asked respondents to their regular survey '[l]ooking back over the last 2 or 3 years do you think the quality of service you usually receive when you purchased goods and services has improved a lot, a little, stayed about the same, got worse or got a lot worse?' A majority, but not an overwhelming majority, said yes, as one would expect, although this cannot all be attributed to liberalisation *per se*, because there would be other factors (including normal change) at work. What is fascinating is that low-income households were markedly less favourable than high-income households. Table 6.4 also shows that in regard to three of the four industries specifically examined, quality was thought to have deteriorated. No doubt, a typical New Zealand audience would overwhelm a listener with anecdotes of what are thought to be deteriorating service provision, often unfairly. It is the distributional implications which are intriguing (Easton 1996).

## 6.12 What has happened to productivity in New Zealand?

The above discussion has been deliberately over-deterministic in offering far more theories than are perhaps necessary to explain productivity change in the 1980s and 1990s. This is because the paper is more interested in promoting, rather than eliminating, discussion, although it has not hesitated to rule out theories which do not connect with the known facts, and can only be sustained in ideological terms. But we have reached the stage where the author's account has to be presented.

I am inclined to the view on the basis of available evidence that the best interpretation is there is a long-term constant trend in labour productivity (or MFP), which is largely exogenous until the mid 1980s.[21] There may have been a climacteric in the late 1980s, but there is a need for more data to evaluate that proposition. The observable burst in the mid 1980s before any climacteric may be due to the investment activities of the late 1970s and early 1980s (as well as the cyclical upturn of 1984 and 1985).

There are only limited direct policy influences over the productivity trend. The evidence is the corporatisation of government trading activities did lift it a little, but there is little other evidence for any other significant gains (other than in improving quality and choice). Any gains from the introduction of the ECA were one-off and small — if any.

While it is proper to postulate gains from market liberalisation, the scientist need not be surprised if they are small, as appears in the New Zealand case. Economic theory usually only predicts direction, not magnitude. A review of the gains from trade found no gain exceeded 1 per cent of GDP, despite high effective rates of protection (ERPs) (Easton 1980b).[22] The theory says that under certain assumptions there is a peak on the output hyper-surface at the free trade point — it does not say whether that peak is a razor edge or a gentle hummock.

The one phenomenon which seems to induce productivity to vary from its longer-term trend is process of economic growth itself. As a general rule, an acceleration of productivity growth will occur in the early part of the a cyclical upswing, as the labour force is employed more intensively and as producers introduce new procedures to increase output and remove bottle-necks. The timing evidence supports those who argue that cyclical effects dominate year-

[21] I would not rule out that the secular growth rate is slowly decelerating, but not fast enough to be easily measured.

[22] Note the ERP have been over-estimated in New Zealand because various tariff exemptions were ignored (Easton 1997a).

to-year productivity changes rather than the opposite and that macroeconomic influences will tend to dominate the microeconomic influences. But any support for this view has an important caveat, especially in regard to market liberalisation.

For while it very difficult to find evidence that market liberalisation generated significant productivity gains in the New Zealand case (corporatisation aside, and allowing the quality and choice gains), market liberalisation may be important for flexibility reasons. An economy is subject to many exogenous shocks — some small, some large — especially if the economy is a small open multi-sectoral one. A less bureaucratically administered market is often better at absorbing these shocks than a more bureaucratically controlled one. As every engineer knows some flexibility has to be built into a structure to enable it to survive. The first trip on a 747 can be nerve-wracking as it shudders about in the air, but the experienced traveller knows that flexibility adds to the safety.

This greater flexibility of the market may lead to better economic growth in a practical way, in so far as it allows the cyclical expansion to continue a little longer. New Zealand cyclical downturns are usually associated with rising bottlenecks which precipitate either inflation or an external deficit blow out (or both) Easton (1997a). Flexibility should eliminate, reduce or delay the bottlenecks, thus prolonging the growth, and enhancing the accumulation of productivity. This is not a negligible gain from market flexibility, although less than some advocates of liberalisation claim.

This theory may be tested over the next year or two, albeit at a different phase in the cycle. New Zealand seems to be moving into a consumption led expenditure expansion (from tax cuts and the AMP de-mutualisation) with an export led production deceleration or contraction (from the Asian crisis). The outcome is uncertain but providing the financial system is sound (it was not in 1987) firms will scrape through with less pain (such as closure and bankruptcy) than if the market liberalisation had not occurred.[23] More gloomily, the considerable associated reduction in social protection may mean that while firms may better cope with the next two difficult years, people may not.

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## **Discussant** — *Winton Bates*

What are we able to learn from the New Zealand experience? Brian Easton suggests that policy change has had little influence on the rate of growth in productivity in New Zealand. He interprets available evidence as suggesting that 'there is a long-term constant trend in labour productivity (or multifactor productivity), which is largely exogenous'.

### Evidence of productivity growth in New Zealand

Easton's conclusion is based largely on a consideration of trends in average labour productivity (output per unit of labour). In my view, in considering the relationship between micro-economic reform and productivity growth, it is more appropriate to focus on measures of MFP. Microeconomic reforms can have important effects on the efficiency with which both capital and labour inputs are used. Reforms that result in a decline in output per unit of labour (eg labour market reforms that make it profitable for firms to increase employment in order to make more intensive use of capital) should not necessarily be counted as having a negative impact on productivity.

The OECD's estimates of total factor productivity growth in the business sector of OECD countries, shown in Table 6.D1, do not support Easton's assertion that there is a long-run constant trend in productivity growth in New Zealand or in other OECD countries.

Table 6.D1: **OECD estimates of growth in multifactor productivity, New Zealand, Australia and the OECD, 1960 to 1996** (per cent per annum)

| | *1960–79* | *1979–96* |
|---|---|---|
| New Zealand | 0.7 | 1.1 |
| Australia | 1.8 | 0.8 |
| OECD | 2.4 | 1.1 |

*Source*: OECD (1997, p. A66).

A major productivity study by Fare, Grosskopf and Margaritis (in Silverstone *et al.* 1996), covers time periods more closely corresponding to the pre-reform period and the period since the reforms commenced. This study estimated that average MFP growth increased from 0.7 per cent per annum during 1973 to

1984 to 2.4 per cent per annum during 1984 to 1994.[24] The study shows rates of productivity growth vary substantially between industries, but in 13 out of the 20 industries covered the annual rate of MFP growth increased by more than 0.5 per cent per annum between the two periods. It seems likely, as the authors suggest, that their methodology may tend to underestimate growth in MFP during 1984 to 1994 because unproductive investments made in response to distorted price signals in the pre-reform period were still reflected in measured capital stock during that period.

## How should the reforms be assessed?

Easton makes the point that since the New Zealand reforms have been unusually comprehensive and thorough, they provide a test of the theory which underpins them. While it seems to me that a strong case can be made that productivity of the New Zealand economy has improved since the reforms commenced, I do not think that evidence of either magnificent or hopeless performance in this period would be sufficient to decide the issue of whether reforms of this kind are worthwhile.

Apart from the obvious point that it is not wise to draw strong conclusions from a sample of one country, there are other factors that need to be considered. These include:

- the influence of other factors;
- the timing of the impacts on measured productivity;
- the question of what would have happened otherwise; and
- the limitations of aggregate productivity measures as indicators of the net benefits of microeconomic reforms.

### *The influence of other factors*

While the reforms represent one of the most notable episodes of economic liberalisation to have occurred anywhere, their impact on productivity growth, particularly in the period 1987 to 1992, was overshadowed by other factors such as the impact of anti-inflationary policies in a relatively inflexible economy. It

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[24] The estimates of productivity growth obtained in this study have been checked against those obtained in an earlier study, by Simon Chapple, using a conventional growth accounting methodology for the periods 1972 to 1984 and 1984 to 1991. Both studies resulted in similar estimates of average productivity growth in both periods although estimates of productivity growth were markedly different in some industries. This conclusion is based on data presented in the chapter by Fare, Grosskopf and Margaritis in Silverstone *et al.* (1996, p. 97).

is also arguable that, despite the reforms, some aspects of economic policy are still not conducive to strong economic performance. For example, some important export activities remain under the exclusive control of statutory marketing organisations and government expenditure remains relatively high as a percentage of GDP, even by OECD standards. The authors of an article on the reforms in the *Journal of Economic Literature* (Evans, Grimes, Wilkinson and Teece 1996, p. 1894) argue that: 'Further reform in certain areas, such as education, health and welfare, are likely to be necessary if New Zealand is to achieve its potential'.

### *The timing of impacts*

In my view, it is not yet possible to obtain a reliable picture of the impact of micro-economic reform on productivity growth in New Zealand from aggregate statistics. This is partly because measurement problems, particularly the problem of measuring capital stock referred to earlier, have tended to obscure the short-term effect of the reforms on productivity levels. More importantly, it is not yet possible to assess the ongoing effects of the reforms on productivity growth because insufficient time has elapsed for effects on economic flexibility and innovativeness to show up in aggregate measures of productivity growth.

There are good reasons why it could be expected to take a decade or more for an inflexible economy to make the transition from poor performance to a sustainably higher growth path after policy reforms have occurred. It can take a considerable amount of time for firms and individuals to accept that the new market incentives are likely to be sustained and to discern the implications for their own activities, particularly in an unstable macroeconomic environment. Additional time is required to implement change by learning new skills and business practices. And while new strategies are being implemented they may be vulnerable to disruption by a range of factors, including the impact on real exchange rates of a relaxation of fiscal restraint.

The time lags involved before the effects of microeconomic reform show up in aggregate statistics do not prevent the use of survey data to assess changes in productivity performance. Firm survey evidence, from the quarterly survey of business opinion undertaken by the New Zealand Institute of Economic Research (NZIER), provides support for the view that productivity growth has increased since the reforms. Yeabsley and Savage (1996) recorded that the proportion of survey firms reporting higher productivity rose from 14 per cent in the expansion phase of the business cycle from 1978 to 1986 (before the reforms took effect) to 30 per cent in the expansion phase from 1991 to 1996. As I have previously suggested (Bates 1997), it may be possible to make more use of data of this kind to monitor the process of adjustment to microeconomic reforms.

### *What would have happened otherwise?*

One way we can get some idea of what would have happened in New Zealand in the absence of the reforms is by looking at what has happened in countries with broadly similar characteristics.

This must involve some attempt to 'measure' the state of economic policies in different countries — a task which is obviously fraught with difficulty. The best attempts to do this that I am aware of are the measures of economic freedom by Gwartney and Lawson (1997) which are the outcome of a major project initiated by the Fraser Institute a decade ago. The components of the economic freedom index are indicators of institutional structure and economic policy.

One of the findings to emerge from the study by Gwartney and Lawson is that both per capita incomes and economic growth rates are highly correlated with their measure of economic freedom. Some further analysis of the data for 20 OECD countries, shown in Table 6.D2, suggests that the OECD countries that have undertaken greatest reforms have been relatively immune from the decline in average MFP growth that has occurred in nearly all OECD countries since the 1970s. The small improvement in New Zealand's estimated MFP growth rate (see Table 6.D1) represents remarkably strong performance, given the extent of decline in MFP growth rate that occurred in many other OECD economies.

### *Limitations of aggregate productivity measures*

It would be a mistake to assess economic reforms entirely in terms of their impact on aggregate measures of productivity change, even if the influence of policy reforms on productivity could be disentangled from other factors with a great degree of confidence. Aggregate measures of productivity change miss out on a lot of the important action that takes place at a micro level as a result of reforms. This includes the benefits to consumers from:

- removal of price distortions associated with tariffs and discriminatory taxes;
- improvements in the quality of products and services that have occurred as a result of removal of restrictions on international and domestic competition; and
- other regulatory reforms (for example, termination of restrictions on shop trading hours).

In addition, many of the benefits to both employers and employees of being able to negotiate individual employment contracts that suit their particular circumstances are not necessarily reflected in productivity, as conventionally measured.

Table 6.D2: **Relationship between reform and MFP growth in OECD countries, 1960 to 1996**

| *Reform category*[a] | *Number of countries* | *MFP growth rate 1979 to 1996* | *Change in MFP growth rate 1960–79 to 1979–96* |
|---|---|---|---|
| | *No.* | *% per annum* | *% per annum* |
| Greatest reform (includes NZ) | 6 | 1.4 | -0.7 |
| Moderate reform (includes Australia) | 7 | 1.4 | -1.0 |
| Other | 7 | 0.6 | -1.9 |

*a* The reform category is determined by: change in freedom rating from 1980 to 1995 divided by the maximum improvement in freedom rating that would have been possible over that period.[25]
*Source:* Authors calculations based on freedom ratings by Gwartney and Lawson (1997) and estimates of MFP growth rates from OECD (1997).

In my view, New Zealand's microeconomic reforms should be assessed primarily in terms of how the new 'rules of the game' in various broad policy areas are affecting economic behaviour at the micro level, rather than in terms of what is happening or might happen to the New Zealand economy at an aggregate level. The microeconomic reforms in the period 1985 to 1995 are not the only factor influencing the New Zealand economy. Moreover, the reforms did not come down from heaven in one big package. The efficiency and equity issues involved were considered on their merits by governments, one major area of reform at a time.

To sum up, available evidence suggests that multifactor productivity growth in New Zealand has improved, particularly relative to what would have occurred in the absence of reform, and I think there are good reasons to expect that it will improve further. However, we should not expect to learn a great deal about the relationship between microeconomic reform and productivity growth by looking at aggregate productivity statistics for one economy, even one that has

[25] The indicator for NZ was 62 per cent of the maximum, while that for Australia was 32 per cent.

undertaken major reforms. Australians can learn more from New Zealand's microeconomic reform experience by looking at the effects of reforms undertaken in particular policy areas such as the labour market, corporatisation and privatisation of state owned enterprises, taxation and industry assistance.

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## **Discussant** — *Richard Snape*

Brian Easton seeks evidence to test the hypothesis that increased productivity has followed the New Zealand reforms, and by and large he does not find it. He is using a measure of labour productivity. He does not use multifactor productivity because of the problems in measuring capital. That is a pity, but perhaps others can try it. As I said, by and large he does not find the evidence of increased productivity, though at some points in the paper he does indicate that there have been increases in productivity for some industries. He also explicitly acknowledges, which I think is very important, the problems of measuring quality and of choice.

Generally, Easton is rather dismissive of evidence of sectoral or industry gains. On industry gains, or looking at industries, he says there are too many special factors and generally no lessons can be gained. For example, on the Think Big or major projects, he points the finger at a number of features where there were problems. I will just mention three. He suggests that some of the projects were undertaken simply to use an energy surplus. Of course, if there's a zero-priced resource it does not mean you have to use it. If you do, then you will use other factors also, and of course those other factors may have a higher opportunity cost. Secondly, he states that some projects were known to be inefficient at the time. Thirdly, that there were some severe cost overruns.

With all of these points one has to ask, I think, were these mistakes endogenous to the unreformed economy? Was it because of the nature of the economy and the political economy and the nature of the incentive mechanisms that were facing the decision-makers at the time that these mistakes were made? That is not to say that markets do not make mistakes, of course. But these were mistakes that were made in an unreformed economy and as I understand it, most of the reforms that were made in New Zealand, were designed to change the overall incentive structure and to change the incentives for decision-makers generally so that they would be less inclined to make the type of mistakes described.

Several times in the paper reference is made to the exchange rate being overvalued in recent years. I agree that exchange rates are very important in evaluating productivity, particularly where capital flows are involved, as in this case. As Quiggin emphasised (Chapter 4), what one should be looking at ideally is not gross domestic product but the national – not domestic – consumption stream, appropriately discounted. When you have got substantial capital inflows which have been supporting the exchange rate, then one needs to take account of that in terms of the consumption flows that may be supported by that investment. I also have a bit of trouble with the term of 'overvalued exchange rate' when in fact it is a floating exchange rate.

I think what Easton's paper shows most of all is the problem of measurement. There is the problem of quality, the problem of choice, as he mentions, and there's a problem with measuring the capital stock, as he also mentions. Another area of measurement problem is in productivity and price deflators. Referring to Figure 6.4, average labour productivity broken down into importables, exportables and non-tradeables. I was not able to get the source, so could not check what deflators were used. Let us look at importables as a case in point.

With the reforms in the trade sector in New Zealand, one would expect that the price of importables would have decreased substantially relative to other goods, certainly if the import price was measured properly to take account of availability and quotas, *etcetera*. Then, appropriate sectoral import price deflators should enable the price effects of reform to be observed, providing that the price analysis is undertaken industry by industry and that in each industry, importables are separated out from exportables and non-tradeables. However, if the price indexes within each industry category include a mixture of importables and other products, there could be a substantial measurement problem. So, it is very important to know, in detail, how that price deflator cited in the analysis was calculated.

Another problem is that there have been major structural changes. I would have preferred to see the period which is being addressed, which is generally 1985 to 1996, broken down. One would like to attempt to disentangle cyclical factors, which clearly are operating, from other factors. One would also like to disentangle steps in productivity change from changes in rates of growth. But looking at the period as a whole, one is unable to do that.

Then there's the question of a counterfactual. This problem was mentioned in Section 6.2, and one counterfactual is mentioned and discussed and dismissed — and probably rightly dismissed. I am not questioning the dismissal of that particular counterfactual. But one nevertheless would like to have another counterfactual. Were the policy settings up to the early eighties sustainable? What would have happened if they had been continued? What was going on before?

Not everyone was as sanguine as Easton appears to be about the prospects of New Zealand under the policies that were in place in the early 1980s. It was interesting to look at the tables presented by Dowrick (Chapter 5). There were 84 country observations; that is, four times 21 (for the number of countries in the study). If one looks at the column which is growth of real GDP and runs down that, and if one looks at the pre-1980 period, one finds a figure of minus 2.6 per cent for New Zealand. There are only two other figures in the whole table which are below that. Going to the final column unexplained MFP growth is minus 2.3 per cent for New Zealand. These figures are relative to the OECD growth rate of 3 per cent. There is only one MFP figure in the whole table for the most recent period which is below New Zealand, and that is Switzerland.

Finally, at the beginning of the paper, Easton refers to the New Zealand reforms and economic rationalism as being an application of neoclassical economics. I would say that economic rationalism and the reforms of New Zealand would have had large slabs of neoclassical influence on them, but I do not think that that is a correct description of what it was all about. I would say that they are much more Austrian, in the sense that they refer to incentives in the economy as a whole; not just neoclassical in a narrow context of resource allocation, but much more in a broader system of the incentive mechanisms for the economy as a whole. It is more Chicago and Austrian than what is generally referred to as neoclassical.

## General discussion

The discussion focussed on the following themes:

- adjustment costs and the process of adjustment to reforms;
- productivity measurement; and
- the observability of microeconomic reform effects.

### Adjustment costs

It was suggested that, in the context of a rapid series of policy changes, such as in New Zealand, long-term responses could be expected to be very long term, while the short-run responses would be longer than usual. The reasons for this include the length of time it takes financial markets to adjust, the upheaval to the capital stock and attendant capital stock revaluations and various biological effects of reform on primary production (such as through adjustments to fish stocks). These various institutional and capital effects may take some time to work through the economy.

Easton reported that little attention had been paid to the adjustment process and cost issues in policy analysis in New Zealand. The general approach to reform had been to implement the changes as quickly as possible. In his assessment, the issue of the appropriate sequencing of reforms was never seriously debated.

### Productivity measurement

There is a view that the traditional approach to measuring productivity may result in estimates that are upwardly biased. The two traditional approaches both ignore the contribution of services in the production process — one involves using value added figures for output, with capital and labour as inputs, while the other involves using gross output and capital, labour, materials and energy as inputs. When there is an increase in the contracting out of service inputs, productivity estimates not incorporating the effects of such an increase could be biased upwards. Easton agreed that outsourcing can create measurement problems and suggested that it was an important area for future research.

### Observability of reform effects

The issue of how the effect of microeconomic reforms may be observed through aggregate data was raised. It was noted that, while some sectors in New Zealand displayed large productivity gains following reforms, there was no evidence of a one-to-one link between productivity gains in individual sectors and productivity gains for the economy as a whole. It was also suggested that if economy-wide benefits from microeconomic reform are expected for New Zealand, they are taking a long time to emerge. This was thought to be particularly relevant, given the speed with which such reforms could be expected to flow through to the macroeconomy. Two explanations for the apparent lack of evidence of microeconomic reform in the New Zealand macroeconomic data were provided, namely, that lags in New Zealand are longer than generally expected or there are other more general reasons for the relatively poor performance of New Zealand productivity growth.

Another important concern for assessing the effects of reform on productivity growth in New Zealand is the absence of a counterfactual, that is, output and productivity growth in the absence of microeconomic reform and restructuring. The absence of such a counterfactual has meant that the record of recent growth has been assessed against expectations concerning the effects of reform rather than against an outcome in the absence of reform.

# PART D: THE AUSTRALIAN PERSPECTIVE

# 7 A GENERAL REVIEW OF PRODUCTIVITY ANALYSES IN AUSTRALIA

*Peter Dawkins and Mark Rogers*

## 7.1 Introduction

This paper reviews a wide range of productivity studies, ranging from survey based firm-level studies to macroeconomic time-series studies. The review must, therefore, cover a wide range of techniques, concepts and findings. To make the review manageable it concentrates on papers published post-1980 which include some level of 'analysis', rather than solely description and discussion. The primary aim is to assess what is known about the determinants of Australian productivity. To this end, we include analysis whether it is based on data at the workplace, firm, industry, sector or economy level and whatever method of analysis is used. Such a review runs the risk of covering too much information on diverse techniques. To avoid this an Appendix contains the basic details of the various analyses, and the main text is devoted to summarising the key points.

The structure of the paper is as follows. Section 7.2 provides a brief overview of the level and growth of productivity in Australia considering time series trends, international comparisons and also 'within' versus 'between' industry differences. Section 7.3 contains the review of recent productivity analyses. The section is organised into three sub-sections: firm and specific industry studies, industry level studies, and sector and economy level studies. Section 7.4 summarises the nature and findings of these studies. The last section concludes and provides suggestions for future work.

Productivity studies are essentially concerned with understanding why output per unit of input(s) changes. For the market sector, output is normally defined in value terms, but some studies define output in physical units. The most common inputs considered are labour and capital, either independently, or in combination (which yields the multifactor productivity (MFP) measure). There are a host of issues surrounding the calculation of various productivity measures but these are not discussed here (see Blackburn 1984, and Aspden 1990, for some Australian discussion, and Diewert 1992, for a more theoretical discussion).

As stated, we are primarily interested in understanding the factors that determine productivity. An important distinction to make is whether a factor affects the level or the growth rate of productivity. The difference between these can be succinctly described by reference to a production frontier. A level effect can be defined as a movement towards a production frontier, whereas a growth effect concerns the outward movement of the production frontier itself. The production frontier can be defined at the firm, industry or economy level. Level effects are, therefore, concerned with the inefficiency of the firm (or industry or economy) relative to others. As we shall see, some studies focus entirely on the factors that determine the level of productivity or, equivalently, the distance firms are from the production frontier. The growth rate of productivity will, of course, vary as firms are moved towards the frontier, but the growth effect will be short lived. In contrast, in the long run, growth can only be achieved by the movement of the frontier itself.

Even though the conceptual distinction between level and growth effects is clear, in practice, we find that factors cannot be neatly divided into either having long run growth or level effects. For example, the extent of competition in an industry is often thought to be an important determinant of the level of inefficiency in an industry. However, the extent of competition may also affect the nature of innovation and, in turn, the long-run growth rate. Despite these difficulties, it is still useful to try to classify factors into level and growth categories, even if simply to acknowledge that they may affect both. This is something that, in our opinion, many studies are unclear about. Table 7.1 lists some potential determinants of productivity and attempts a division into whether they primarily affect the level or the growth rate of productivity. For a more detailed discussion of such determinants, and an assessment of recent economy level trends, see Industry Commission (1995, Chapter 3).

Table 7.1: **Determinants of productivity**

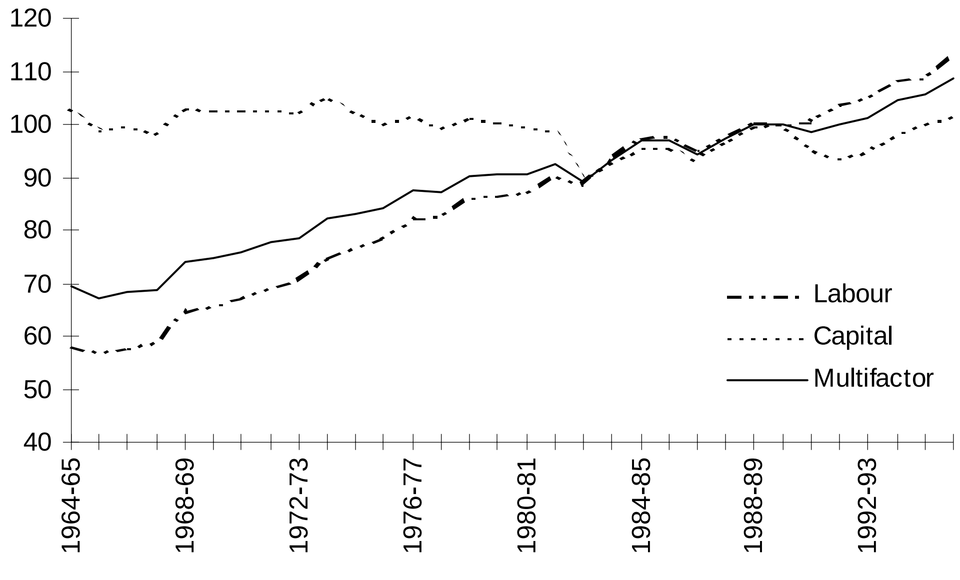
| | *Factors affecting productivity* | |
|---|---|---|
| *Affecting level* | *Affecting level and growth* | *Affecting long-run growth* |
| scale of firm | industrial relations | R&D and innovation |
| scope of firm | international openness | growth of factor prices |
| cyclical factors | competition | capital investment |
| work practices | training | human capital investment |
| capital intensity | infrastructure | |

## 7.2 Overview of the level and growth of Australian productivity

### 7.2.1 Time series

Figure 7.1 shows three principal measures of productivity (labour, capital and MFP) for the market sector in Australia over the 1964 to 1996 period. Casual inspection suggests labour and MFP have grown relatively steadily, while capital productivity has been static if not in decline. Interestingly, while we report on many studies into labour and MFP, there appears to be little analysis on capital productivity perhaps due to well known measurement problems (see Lattimore 1990, and Gretton and Fisher 1997).

Figure 7.1: **Market sector productivity in Australia,[a,b,c] 1964–65 to 1995–96** (indexes 1989–90=100)




a Constant price gross product per hour worked.
b Constant price gross product per unit of capital stock.
c Constant price gross product per combined unit of labour and capital.
*Source*: ABS Cat. No. 5234.0.

Table 7.2 shows the associated growth figures for various sub-periods (as calculated between MFP growth cycle peaks). The table shows the dip in labour productivity growth in the 1984–85 to 1988–89 period that has been the topic of some debate. Figure 7.1 and Table 7.2 essentially provide the macroeconomic data for the papers discussed below.[1]

Table 7.2: **The annual percentage change of productivity in the market sector, 1964–65 to 1995–96** (average annual growth between MFP growth-cycle peaks, per cent)

| | *Labour*[a] | *Capital*[b] | *Multifactor*[c] |
|---|---|---|---|
| 1964–65 to 1968–69 | 2.6 | .. | 1.7 |
| 1968–69 to 1973–74 | 2.9 | 0.5 | 2.1 |
| 1973–74 to 1981–82 | 2.4 | -0.8 | 1.5 |
| 1981–82 to 1984–85 | 2.6 | -1.0 | 1.5 |
| 1984–85 to 1988–89 | 0.7 | 1.0 | 0.8 |
| 1988–89 to 1995–96 | 1.7 | 0.3 | 1.2 |
| 1964–65 to 1995–96 | 2.2 | -0.1 | 1.5 |

a Constant price gross product per hour worked.
b Constant price gross product per unit of capital stock.
c Constant price gross product per combined unit of labour and capital.
*Source*: ABS Cat. No. 5234.0.

### 7.2.2 International comparisons

It is important to place Australia's performance in international perspective. A number of studies have undertaken such an analysis (including Gruen 1986, Dowrick 1990, Pilat, Rao and Shepherd 1993, Rao, Shepherd and Pilat 1995, Pilat, 1996, and various OECD and Australian government papers). Comparisons have been made on the basis of productivity levels and growth rates, and also on the basis of separate industries. Needless to say, there are a host of measurement issues surrounding such comparisons, but these are not the subject of this paper. Table 7.3 shows some recent OECD data on productivity performance for Australia, Ireland, Netherlands and the OECD average. It is interesting to note that, over the 1979 to 1996 period, Australian labour and MFP productivity growth has been close to the OECD average. However, in comparison to smaller OECD countries (ie non-G7), Australia's performance

[1] For a more historical view, see Oxley and Greasley (1995) and Pope and Withers (1995) who consider labour productivity since the 1870s.

over this period has been below average. The figures for Netherlands and Ireland illustrate this fact.

Table 7.3: **Australia's productivity performance, 1960 to 1996** (annual average growth, per cent)

| | *Multifactor productivity* | | | *Labour productivity*[a] | | |
|---|---|---|---|---|---|---|
| | *1960–73* | *1973–79* | *1979–96* | *1960–73* | *1973–79* | *1979–96* |
| Australia | 2.1 | 1.1 | 0.8 | 3.2 | 2.4 | 1.3 |
| Ireland | 4.3 | 3.7 | 3.4 | 4.8 | 4.3 | 3.9 |
| Netherlands | 3.5 | 1.7 | 1.2 | 4.9 | 2.6 | 1.6 |
| OECD small country average | 2.9 | 1.2 | 1.4 | 5.0 | 3.1 | 2.6 |
| OECD average | 3.1 | 0.8 | 0.9 | 4.6 | 1.8 | 1.6 |

a Labour productivity is output per worker employed.
*Source*: OECD (1997, Annex Table 58).

Considering only growth rates can hide the fact that there are differences in productivity levels across countries. Such differences imply that Australia can 'catch-up' on world's best practice (ie approach the world production frontier — a level effect). Comparing productivity levels requires the use of some form of purchasing power parity measures and there is an extensive literature on which measures are best (see van Ark 1996, for a review). Table 7.4 shows some figures comparing manufacturing productivity from a study by Pilat (1996). In brief, Australian industries appear to be some distance from the world production frontier. This is only one study reporting productivity gaps which is based on industry level purchasing power parities. However, other studies show the presence of similar gaps, although the magnitude of these gaps does vary (see for example, Industry Commission 1997, Chapter 6). Comparing service sectors is more problematic (due to the non-tradeable nature of much of the output), but Pilat reports similar productivity gaps in some, but not all, service industries. A further set of evidence about the existence of productivity gaps is provided in Industry Commission (1997, Chapter 6).

Table 7.4: **Relative labour productivity in manufacturing,[a] 1993**
(value added per hour worked, leader country=100[b])

| | *USA* | *Japan* | *Germany* | *Canada* | *Nether-lands* | *Australia* |
|---|---|---|---|---|---|---|
| Manufacturing | **100.0** | 76.6 | 81.3 | 71.3 | 95.6 | 52.0 |
| *Selected industries* | | | | | | |
| Textiles, clothing and footwear | 78.3 | 41.9 | 70.3 | 46.3 | **100.0** | 32.3 |
| Paper products and printing | 85.0 | 49.7 | 56.6 | 67.6 | 64.5 | 53.7 |
| Metal products | 68.9 | 67.6 | 67.2 | 54.8 | 54 | 35.9 |
| Machinery and equipment | **100.0** | 67.4 | 58.7 | 55.5 | 34.6 | 46.4 |
| Electrical machinery | 80.3 | 89.0 | 54 | 51.9 | 82.2 | 28.0 |

a Based on industry-specific conversion factors to compare across countries (Pilat 1996).
b The leading country is not shown in the table for each activity.
*Source*: Pilat (1996, Table 4, p.19).

### 7.2.3 Within and between industry productivity differences

The previous section, although based on international comparisons, touched on the fact that productivity performance varies between industries and sectors. One possible implication of this is that the existence of differences in productivity levels within Australia create the opportunity for a reallocation of resources between industries. In turn, this implies such reallocations could be important in explaining aggregate trends. However, this does not appear to be the case. Lowe (1995, p. 100) and Dixon and McDonald (1992, p. 106) carry out a decomposition of the importance of 'between industry' reallocation of resources in explaining productivity growth. Both papers find reallocation across industries accounts for a small proportion of the total growth in productivity.[2] Although this may appear odd given the large recorded differences in average productivity between sectors, it is important to note, as Lowe (1995) points out, that reallocation depends on marginal, not average,

2 Harris and Phillips (1984) carry out a similar analysis on the 1973 to 1982 period and find similar results.

productivity. There appear to be no studies that try to analyse the marginal productivity differences which would be the basis for allocative gains.

Dowrick (1990a) provides some figures for variation in productivity growth rates across sectors (for the period 1974 to 1988) which are shown in Table 7.5. The basic message from the table is that growth rates varied substantially across sectors, especially in the 1983 to 1988 period. Lowe (1995, p. 101) presents graphs of within industry growth rates, including for the 1991 to 1994 period, again showing that within industry variations are large. Industry Commission (1997, Chapter 5 and Appendix C) also presents figures for productivity level and growth differences between 10 sectors of the economy (including multifactor productivity estimates). Again the Industry Commission figures suggest significant differences between sector performance. These facts set a clear agenda for empirical analysis, namely, why does productivity performance vary so much across industries?

Table 7. 5 **Labour productivity growth by sector, 1974 to 1979, 1979 to 1983, 1983 to 1988** (annual average growth, financial years beginning in July of each year)

| | | *Growth of output per hour worked* | | |
|---|---|---|---|---|
| | *ASIC Divisions* | *1974–79* | *1979–83* | *1983–88* |
| A | Agriculture, forestry, fishing | 3.8 | 3.7 | -1.0 |
| B | Mining | 2.0 | -1.4 | 5.5 |
| C | Manufacturing | 3.5 | 3.2 | 2.4 |
| D | Electricity, Gas & Water | 1.9 | 3.9 | 6.8 |
| E | Construction | 3.9 | 3.9 | -0.7 |
| F | Wholesale & retail trade | 0.3 | 2.9 | -0.9 |
| G,H | Transport, storage & communication | 5.0 | 3.2 | 4.5 |
| L | Recreation, personal & other services | -0.1 | 0.6 | -2.8 |
| | Total | 2.0 | 1.9 | 1.1 |

*Source*: Dowrick (1990a, Table 1, p. 177, original data from ABS).

## 7.3 Explaining productivity

### 7.3.1 Studies of particular firms or industries

*International comparisons of matched plants*

A number of studies by the Bureau of Industry Economics involved international comparisons of matched plants in the same industry. Examples include a study of international productivity differences in the manufacturing of photographic paper (BIE 1990, and Harris, Jubb, Lee and Underhill 1991) and a study of international comparisons of plant productivity in the manufacture of water heaters (BIE 1991, and Harris and Madge 1993). Since both studies are similar in both method and outcomes, we describe here only the photographic paper studies.

Kodak was the case study firm for the photographic paper study and the approach was to collect data from one Kodak plant from each of four countries — Australia, Brazil, Canada and the United Kingdom. This involved detailed questionnaires and personal interviews with a large range of management and other employees in the paper finishing areas, as well as interviews with related areas such as training, maintenance and trade union representatives. The researchers also sought to place the case study in the context of the country in which it resided by referring to data for the country, as well as interviewing employer, labour and government organisations.

For each plant, labour productivity was measured in terms of square metres of photographic paper per unit of labour. Labour was measured in two ways: first, in number of employees; and second, in employee hours. Capital was also measured in two ways. The first was in terms of the value of plant and structures employed in the process and the second allowed for the number of hours of production. Comparisons were also made in the unit costs of production between the plants under investigation. On all these measures productivity in the Australian plant came out as being relatively low.

In trying to explain these differences attention was given to such areas as the influence of market characteristics, management practices, training, work practices (including operating time which was relatively low in Australia), unions and government. The assessment involved a mixture of quantitative and qualitative material, although there was no attempt to provide quantitative estimates of the contribution of each of the factors. Many of the factors, of course, interact, and in such a case study approach, it is hard to see how such quantitative estimates could be achieved.

### *Unions and productivity*

The analysis of the effect of unions on productivity has been greatly influenced by the idea, following, Freeman and Medoff (1984) that there are two faces of unions. These are the 'monopoly face' and the 'collective voice face'. The monopoly face could lead to lower productivity through such things as restrictive work practices and industrial action, whereas the collective voice face could lead to lower labour turnover and improved communications, and thus higher productivity (Metcalf 1990). Thus, it is an empirical issue whether positive or negative effects on unions dominate.

Empirical studies have often followed Brown and Medoff (1978), in employing the Cobb-Douglas production function to derive an equation for labour productivity as a function of the capital to labour ratio and union density. Where data exist on labour productivity, the capital to labour ratio and union density, this method can be used to estimate the effect of unions on productivity.

Two studies in Australia used the 1990 Australian Workplace Industrial Relations Survey (AWIRS). Because the dependent variable was a subjective five point scale of self assessed productivity relative to competitors, this framework could only be loosely applied, and is therefore perhaps more open to interpretation than some overseas studies. However, both studies, Crockett, *et al.* (1990) and Drago and Wooden (1992), found some evidence of negative union effects on productivity.

One of the advantages of the AWIRS data is that it also possesses information on the number of unions and some of the features of union behaviour within firms. Both studies used these data, in different ways, to shed light on the relevance of the 'collective voice' hypothesis in Australia. Multiple unionism was found to be especially negative and a proxy for union voice also found to be negative. Employer participation was found to be significantly positive in effect, but only where unions were not present.

A more recent study using the AWIRS data, this time alongside the British Workplace Industrial Relations Survey, was by Blanchflower and Machin (1996). It did not find a significant union effect in its Australian equation. However, the effect of unions was not the central focus and one measure of union presence in the workplace was used. As such, it was not comparable to the earlier studies referred to. Its main focus was the effect of competition on productivity. It did find a significant positive effect of product market competition on productivity in Australia, but only in manufacturing.

### *Other studies*

There have also been a number of other studies that focus on specific firms or industries and analyse various aspects of their performance. Such studies allow an in-depth analysis of specific issues surrounding productivity in the relevant firm or industry. There have been a substantial number of reports by the Industry Commission, the Bureau of Industry Economics (BIE) and other agencies, into specific industries that include productivity analysis (for example, Industry Commission 1994, BIE 1994a, 1994b, 1995a, 1995b). These reports are able to investigate in detail the various productivity issues in a particular industry. Moreover, a number of these reports use advanced methods of productivity analysis, such as data envelopment analysis, and are a valuable source of information on methodology. The conclusions from such work are, naturally, diverse and we do not attempt a summary here. The table in the Appendix lists some of these studies under the 'Analysis of specific industries' section.

## 7.3.2 Industry level studies

### *Industry inefficiency and stochastic production frontiers*

There are a number of industry level studies that use data from the 1977 Australian Census of Manufacturing Establishments to assess industry inefficiency. These studies use a stochastic production frontier (SPF) technique to calculate a measure of inefficiency for each industry in Australia (Harris 1992, Mayes, Harris and Lansbury 1994). Intuitively, the SPF method takes the data points of firm productivity within an industry and from these maps out a theoretical production frontier.[3] The (technical) efficiency of each firm is then measured by the distance it is from the frontier. Following this, a summary statistic describing the extent of inefficiency across all firms in the industry is calculated. This overall measure of industry inefficiency can then be used as the dependent variable in regression analysis. Caves (1992) uses a measure of inefficiency from a SPF method for around 20 to 60 Australian manufacturing industries as a dependent variable.[4] Caves investigates a range of explanatory variables including: industry competition, growth, the extent of

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[3] Thus, the method requires unit record level data which is generally held confidentially by the ABS. The studies commissioned the ABS to run the necessary econometric programs to calculate the measures of inefficiency.

[4] The industries are at the 4 digit ASIC level and the inefficiency measure is calculated by Harris (1992). For many industries an inefficiency measure cannot be calculated due the nature of the SPF method.

foreign ownership, regional concentration, the average size of plant, and the ratio of non-productive to total workers. The findings suggest, ‘efficiency increases with plant sizes and with regional concentration of economic activity, declines with protection from international competition ..., and also declines with producer concentration beyond a moderate level’ (Caves 1992, p. 266). Mayes, Harris and Lansbury (1994, p. 171), using a similar empirical approach, find support for Caves' results and, in addition, find that the level of tariff protection in Australian industries adversely affects efficiency.

The strength of the SPF approach is that is produces an overall measure of technical efficiency in an industry. It is worth noting, however, that the statistical process of obtaining such a measure is sensitive to the methods used. Frequently, the firm level data points do not produce any meaningful measure for a particular industry, for example, only 65 per cent of the 140 industries used by Harris (1992, p. 217) yield an efficiency measure. This level of coverage, and the fact that such analysis requires unit record data, perhaps indicates why this type of productivity study is not frequently used.

### *Other industry level studies*

An alternative use of the same 1977–78 Manufacturing Census data is made by Caves (1984). Caves uses a dependent variable based on the relative labour productivity between Australia and the United States (for 138 paired industries). Caves finds that a small domestic market and lack of scale are important factors in explaining the lower, on average, level of Australian productivity. Furthermore, Caves suggests that the high levels of tariff protection (in 1977–78) allowed firms with inefficient scale to operate, dragging down overall productivity. Gretton and Fisher (1997) provide an important study of the implications of industry assistance for productivity measurement. Industry assistance causes prices to deviate from their social value, hence a calculation of the real rate of productivity growth should be conducted using unassisted prices. They note, ‘Using output measures deflated to unassisted prices, real productivity growth is lower than conventional measures indicate when assistance is rising. Conversely, productivity growth is higher than conventionally measured when assistance is falling’ (1997, p. xii).[5]

A different type of industry level research is provided by Whiteman (1988, 1990, 1991). These papers analyse the rate of labour and capital augmenting technical change in 34 manufacturing industries (between 1954 and 1981). Technical change can be thought of as increasing the efficiency of factors of

5 Gretton and Fisher (1997) also contains a detailed discussion on the creation, and use in MFP analysis, of capital service measures for manufacturing sub divisions.

production, hence it is natural to consider whether it has a labour or capital bias. A specific interest is that labour augmenting change may act to reduce the demand for labour. Whiteman finds, over the time period examined, that technical change in Australia exhibited a strong labour bias. The question of what has caused this bias in technical change is taken up by Dixon and McCombie (1991). They use Whiteman's estimates of the factor bias of technical change as an dependent variable in a regression with the wage share as an explanatory variable (finding that it is a significant explanator). The empirical specification they estimate also requires factors that determine the overall rate of technical change, which they proxy with the industry R&D intensity (for 1968–69) and the four firm concentration ratio (for 1976–77). Both R&D intensity and concentration are significant, with higher R&D intensity raising the rate of technical change, while higher concentration reduces the rate of technical change.

An alternative theoretical approach to understanding the growth of productivity is provided by Bloch and Madden (1994). They use a vintage capital model (based on the seminal work of Salter 1966) which links labour productivity growth to the difference in growth rates of wages and capital rents, and the rate of growth of industry output. As with Salter's original model, the growth of labour productivity is also a function of the level of labour saving technical change. Their results support the vintage capital model and, in particular, find that labour productivity growth is higher the more rapid the rate of growth of wages (relative to capital).

As detailed in section 7.2.2, there are wide productivity gaps between Australia and overseas. In an analysis of such gaps, Pilat, Rao and Shepherd (1993) consider United States versus Australian manufacturing productivity at the industry level (1970 to 1989). They find that Australian manufacturing has a level of value added per hour of about 50 per cent of the level of the United States. Their analysis indicates that a maximum of 50 per cent of this difference can be explained by variations in the capital to labour ratio. However, for some industries only 'a small proportion of the productivity gap is explained by capital intensity' (Pilat *et al*. 1993, p. 37).

### 7.3.3 Sector and economy level studies

There have been a series of reports on sector and macro level productivity performance within Australia (eg Industry Commission 1995, 1997). These reports provide an excellent overview of some of the trends and issues, along with analysis of productivity. There are also studies that produce estimates of Australian MFP (for example, Aspden 1990, and Englander and

Mittlestand 1988, and Mercer-Melbourne Institute 1997, for an analysis that includes state level productivity). This section tries to avoid duplicating such work by focusing on reviewing studies that have analysed the determinants of productivity.

### *Decompositions of productivity performance*

There are a number of studies that undertake a decomposition of movements in productivity. As mentioned in section 7.2, one such study is provided by Dixon and McDonald (1992). This paper analyses labour productivity (measured as GDP per person employed) over the period 1971 to 1990. The methodology for such a decomposition involves a series of assumptions, including: first, assuming a particular functional form for the economy level production function (they use both a Cobb-Douglas and a constant elasticity of substitution (CES) functional form); second, that factors are paid their marginal products and hence the factor shares reflect the parameters of the production function; and, third, that the rate of technical change is determined by time trends and the growth rate of the industry. These are, apart from the technical change assumption, similar assumptions to those in the growth accounting literature (see Jorgenson 1995, for a review).

The results of the decomposition are as follows:

- change in the capital to labour ratio explains the largest proportion of labour productivity growth (eg labour productivity grew by 2.14 per cent per annum over the 1971 to 1990 period and the change in capital per unit of labour accounted for 1.33 percentage points of this rise in labour productivity);
- technical change was the next largest explanator of labour productivity shifts (over the period contributing 0.91 percentage points to labour productivity growth); and
- in explaining the slowdown of labour productivity growth in the 1980's they find a reduced rate of increase in capital intensity as well as stochastic factors in agriculture as the most important determinants.

### *The growth slowdown in the 1980's*

The last point above, which refers to the slowdown of productivity growth in the mid-1980's, has also been investigated by other authors (including Dowrick 1990a, 1990b, and Lattimore 1990). Dowrick (1990a) uses a Cobb-Douglas production function for the analysis (although he does not constrain coefficients to equal factor shares). For our purposes here, Dowrick's paper makes a number of important points. First, although there was some labour productivity slowdown at an aggregate level, different sectors had substantially different performances (Table 7.5). Second, that cyclical effects (in the 1981 to 1983 period) accounted for some of the fall in labour productivity. Thirdly, that the fall in the labour to capital ratio contributed to the fall in labour productivity, and that the fall in the ratio was due to rapidly expanding employment not reduced capital investment. Thus, the path of the capital to labour ratio is a key factor, and its movements in the 1980's are often attributed to the Accord holding down real wages.[6] All these results come from an analysis of the labour productivity of the non-farm market sector. For this sector, Dowrick finds no evidence of a slowdown in MFP. In contrast, for the manufacturing sector, he finds that MFP did fall in the 1980's (by an average of 0.5 per cent per annum).

Dowrick (1990a) also analyses Australian performance with respect to other OECD countries. This analysis uses GDP per person employed for the economy as a whole (one problem with such a variable is that some countries assume positive rates of productivity improvement in certain sectors). To improve comparability, Dowrick adjusts labour productivity for cyclical effects and catch-up effects.[7] Catch-up refers to the general fact that poorer countries grow faster that rich countries. Dowrick's OECD comparisons show that, for the 1984 to 1989 period, Australia's adjusted GDP per person employed productivity growth was 0.9 per cent per annum below the OECD average. Of this figure, 0.5 percentage points was attributable to the fall in capital to labour ratio and 0.4 percentage points was due to an unexplained residual. The factors behind these figures are more difficult to ascertain. Obviously, the Accord may have had an important impact on the capital to labour ratio, but there is no explanation for the residual.

6 Hughes, Burgess and Dunlop (1991) also investigate the role of real wages on labour productivity. They run a regression (quarterly from 1970 to 1989) with labour productivity as the dependent variable and with the change in real unit labour costs and output growth as explanatory variables (no capital to labour ratio was included). They find a positive and significant coefficient (an increase in real unit labour costs of 1 per cent implies a 0.45 per cent increase in labour productivity). A regression is also run with MFP as the dependent variable, here again the coefficient on real unit labour cost growth is positive (0.2) and significant, implying real wage growth can have an impact on productivity.

7 As an aside, to control for cyclical effects Dowrick uses the growth of real output as an explanatory variable. The coefficient on this variable is positive and significant, implying productivity rises in an upswing. This is normally thought of as due to hoarding of unused labour and capital in recessions. There is an alternative literature based on Verdoorn's law (namely, that productivity is positively related to the rate of growth of output) which assumes increasing returns to scale may account for the relationship. Hughes *et al.* (1991) and Bairum (1990) discuss these issues in the Australian context.

### *Wage determination systems and productivity*

Dowrick (1993) analysed the effect of wage setting systems on productivity. He argued that a similar relationship between centralisation and productivity is likely to exist as that argued by Calmfors and Driffil (1987) for real wages and unemployment; that is, better outcomes in highly centralised and highly decentralised settings. The argument was based on the idea that labour saving productivity growth tends to reduce labour demand when it is inelastic and increase labour demand when it is elastic. This suggests that unions are likely to oppose productivity increasing changes where labour demand is inelastic and encourage them where labour demand is elastic.

Decentralisation of wage setting, Dowrick (1993) suggests, tends to increase the elasticity of demand:

> It follows that changing from decentralised institutions, eg enterprise unions bargaining with independent firms, to industry level institutions and industry bargaining may switch unions from being cooperative to being obstructive to innovation. The logic of this argument is straightforward. Productivity growth might mean that jobs have to be shed from the industry as a whole. At the firm level, however, an enterprise union will consider only the employment prospects of its own members. By agreeing to productivity increases, the enterprise union can make its employing firm more competitive within the industry. This may increase employment within that firm, even though industry employment is falling in aggregate. Thus it is job competition between enterprise unions which is likely to make them more responsive to change in technology and working practices. (Dowrick 1993, p. 120)

Dowrick's test of this hypothesis of what is in this case a U shaped relationship between productivity growth and the degree of wage centralisation, is econometric in approach and takes into account the presence of productivity gaps (and the associated catch-up). The results supported the hypothesis that fully decentralised, or fully centralised systems, do better in terms of productivity growth than partially centralised systems. However, fully decentralised systems were found to perform somewhat better than fully centralised systems.

Dowrick therefore suggests that on grounds of productivity, the evidence appears to suggest that a policy of radical decentralisation is preferred to the partial decentralisation which has tended to be the recent approach:

> If decentralisation is only partially achieved, productivity growth is not likely to increase — apart from, perhaps one off improvement in response to the opportunity to negotiate over inefficient work practices. The cross country evidence suggests that the longer-term impact on productivity growth of partial decentralisation is likely to be negative. (Dowrick 1993, p. 31)

Dowrick also indicates a concern that current trends towards decentralisation in Australia may be more apparent than real.

### *Technology, human capital and public capital*

Recent economic growth theory suggests that long run growth may be driven by technology, human capital and public capital (Barro and Sala-i-Martin 1995). A number of studies investigate the role of technology, human capital and public capital in determining productivity in Australia. Technology is a broad term that includes the idea of invention and innovation (which, in turn, includes the process of technological diffusion). A key contribution to these issues for Australia is contained in Appendix QB of *The Research and Development Report* (Industry Commission 1994). The report essentially uses an augmented production function approach where, for example, gross product is dependent on the normal inputs of labour and capital, as well as a range of other factors such as research and development, human capital, international trade, government spending and inflation. Research and development was incorporated by calculating stocks of past R&D, which can be done both for the Australian economy and for international economies (Coe and Helpman 1995). The latter is important since it allows an assessment of how Australian productivity is affected by international R&D (ie the idea of international knowledge spillovers). The report finds that, at the economy level for the period 1970 to 1991, Australian MFP is positively related to both domestic and foreign R&D stocks. Interestingly, the magnitude of the coefficients for foreign R&D stock is lower than the coefficient found on other OECD countries (Coe and Helpman 1995, p. 871). Australia appears therefore to be relatively poor at benefiting from overseas knowledge (Rogers 1997, for a fuller discussion). Rogers (1995) extends this literature by using both R&D and patent based knowledge stocks, again finding an important role for such stocks in explaining the level of Australian MFP over the 1972 to 1990 period.

The *R&D Report* also provides an analysis of R&D by sector for the time period 1976 to 1991 (Industry Commission 1994, Table QB6). The analysis uses sectoral MFP over the period 1975 to 1991 as a dependent variable with the explanatory variables that include R&D split into that carried out in own sector, external to sector (but within Australia), public and foreign. The coefficients vary in significance, sign and magnitude, suggesting the need for more analysis, especially at the industry level. Other economy level variables are also included in the regressions and the results suggest that public infrastructure and education are also important contributors to MFP.

Otto and Voss (1992) provide further evidence of the role of public capital with an empirical analysis for the 1966 to 1990 period. Their analysis uses both output per unit of capital and MFP as dependent variables, with regressions run at both the economy and sectoral level. The results again suggest that public capital (as proxied by government capital stock, either with or without public trading enterprises) has a positive and significant effect on the level of private sector productivity (although this result is only robust at the economy level). However, as Otto and Voss stress, their analysis does not enable the optimal level of the public capital stock to be determined, something which has received little empirical analysis. Savage and Madden (1997) undertake a time series study (1950 to 1994) on Australian labour productivity. Their results confirm the important role of physical capital and, more specifically, they find that investment in telecommunications (as proxied by telephones per capita) is also a positive influence. Their analysis also finds a positive role for human capital investment (proxied by tertiary student enrolment), and the extent of trade openness (export to import ratio).

## 7.4 Overview of Australian Studies

### 7.4.1 The different types of study

There has been considerable interest in analysing productivity in Australia over the last fifteen years. In the course of writing this paper, we have referred to over 30 studies each of which is briefly described in the appendix. We do not claim this to be an exhaustive review but we believe that we have identified most of the most prominent studies which have sought to present quantitative analysis of the determinants of productivity in Australia. The various methodologies of these studies can be summarised as follows:

- some focus on productivity levels and others on productivity growth;
- productivity is measured by labour productivity, multifactor productivity and capital productivity, although the latter is rarely a focus;
- the source data varies from individual workplaces or enterprises, to industry level data, and economy level data. Industry and economy level analysis includes cross-sectional and time series analysis, with some studies extending the analysis to an international level. Workplace and enterprise level analysis have been largely cross-sectional in nature; and
- various quantitative methods are used, including shift-share analysis, regression analysis and frontier production functions. Case study and survey analysis are predominant in the firm and specific industry studies.

The studies have analysed a range of explanations for productivity levels and growth differences. Some of the key issues addressed have been:

- how has productivity varied over time and across countries, industries and enterprises?
- have increases in productivity been due to changes in industry structure or to productivity increases within industries?
- what have been the major causes of productivity growth within industries and firms?
- the extent and nature of international productivity gaps?
- have the wages and industrial relations system constrained productivity in Australia?
- how important is the competitive environment? and
- what is the role of R&D, innovation and human capital?

Some of the major methodological issues that have to be addressed in such studies include:

- how to measure productivity?
- how to measure 'best practice?'
- how to model and measure the determinants of productivity?
- when undertaking macroeconomic research some of the more micro information is missed; and
- when undertaking case studies, many issues tend to require qualitative analysis and care has to be taken about the generalisability of results.

### 7.4.2 Findings

#### *Productivity growth due mainly to increases in productivity within industries*

Studies that have decomposed the importance of 'between industry' reallocation of resources from 'within industry' productivity growth have found that reallocation accounts for a small proportion of total growth in productivity. Furthermore, productivity growth rates do appear to vary dramatically across industry sectors.

#### *Determinants of productivity within industries and firms*

A wide range of variables have been found to influence productivity levels within industries and firms. As far as industry characteristics are concerned, increased competitiveness appears to raise the level of efficiency. This evidence, however, is largely based on 1977–78 data. Evidence for the growth effects of competition appears much more limited. The same data suggests that increased average size of plant and increased regional concentration improves average industry level efficiency. Again, the growth effects of such factors have not been investigated. There are also industry level studies that indicate a close link between labour productivity and the capital to labour ratio. Industrial relations factors have also been identified as important, a factor we return to below.

### *Productivity gaps*

Plant and industry level comparisons of productivity between Australian industry and, for example, United States industry have found evidence of large productivity gaps. This suggests that substantial productivity growth can be achieved in Australia by removing impediments to efficiency and from learning from best practice methods used in overseas operations.

### *Industrial relations and the wages system*

Some evidence suggests that the Australian industrial relations system and union structures have not been conducive to productivity growth and that moves towards enterprise based unionism and more decentralised bargaining may enhance productivity. There is some support for the view that an alternative way to improve the effect of the wage system on productivity is to move towards a corporatist style centralised system, even though the gains for such a move may be lower than a move to a more decentralised system. The attempt that Australia made in this regard, however, with the Accord in the 1980s, had the effect of reducing real wages which probably led to a substitution of labour for capital and contributed to a labour productivity slow down.

### *R&D, human capital and public capital*

There is evidence that the level of R&D positively effects the level of multifactor productivity at the sectoral and industry level. Both domestic R&D and foreign R&D appear to have a positive influence. Some economy level studies have also found a positive role for human capital (as proxied by tertiary school enrolment) and public capital (as proxied by either government capital or, more specific telecommunications capital).

## 7.5 Conclusions and future research

A major difficulty in undertaking a general review of this kind is the extremely broad nature of productivity analysis. We have noted that there are a wide range of measures of productivity (and the various associated measurement issues). In addition, the analysis of productivity can be undertaken anywhere from the micro to macro level. There is also the issue of the distinction between factors that influence the level of productivity and those which influence the growth of productivity.

The review has, however, suggested the need for various extensions to the existing research. These include:

- macroeconomic research can mask important industry variations implying greater attention to industry level cross-sectional and time series analysis. The paper has highlighted how productivity performance varies across industry sectors. Some of these variations will be due to measurement issues (Lowe 1995), but there are also likely to be insights from extending the analysis to the 2, 3 or 4 digit industry level. International studies at an industry level can now also be carried out due to the availability of various OECD data sets;
- further investigation into the role of R&D, human and public capital. Again, due to differences in industry level performance, every effort should be made to undertake this at the industry level. As an example, there appears to be no empirical analysis of the role of training at the industry level;
- the role of reallocation of resources across sectors in productivity performance. Previous papers have suggested such reallocations account for little of the productivity performance. In contrast, more general work on regional and structural adjustment (eg Industry Commission 1993) implies there is scope for productivity improvement. Further research could improve our knowledge on these issues, perhaps by trying to assess the marginal productivity in various industry sectors (differences should imply reallocation);
- the stochastic production function approach, which allows analysis of the determinants of the level of efficiency in industries, has only be carried out for 1977–78 data. Use of more recent census data seems appropriate;
- econometric analysis of firm level productivity data is largely absent. Such analysis would complement the survey and case study firm level analysis. The recent Business Longitudinal Survey is a major resource for such work;
- a greater emphasis on understanding the growth of productivity rather than the level. An example, is the lack of knowledge of how industry competition affects long run growth of an industry; and
- studies have found an important role for the capital to labour ratio in explaining labour productivity (and the influence of real wage growth in determining this ratio). However, there is also the issue of capital

investment and, specifically, how technological change may influence capital investment. This is an area that few studies appear to have focused on.

## Appendix: **Summary of productivity analyses**

| *Name/year* | *Title* | *Study details / methods* | *Subject (firm / industry)* | *Factors investigated, other comments* |
|---|---|---|---|---|
| **Analysis of specific industries** | | | | |
| Bureau of Industry Economics 1990 | International Productivity Differences in Manufacturing — Photographic Paper (see also Harris, Jubb, Lee and Underhill 1991) | Case study | Kodak | Labour and capital productivity and unit cost of production compared between plants in Australia, Brazil, Canada and United Kingdom. Australian plant low performer. Factors investigated — market characteristics, management practices, training, work practices, unions and government. |
| Bureau of Industry Economics 1991 | International Productivity Differences in Manufacturing — Domestic water heaters (see also Harris and Madge 1993) | Case study | S.A. Brewing Holdings | Two plants in Australia, one in New Zealand and one in the United States. Australian and New Zealand plants low performers. Material inputs an important factor. Attitudes and organisation of work also thought to be significant factors. |
| Bureau of Industry Economics Various years | International Performance Indicators series (eg Telecommunications 1995a, Gas 1994b, Electricity 1994a) | Case study | Industry | The BIE conducted a large number of studies on individual sectors and industries under the 'International Performance Indicators' banner. Various measures of partial, labour, capital and MFP productivity are discussed, and some studies use data envelopment analysis. For an overview see BIE (1995b). |
| Tasman Asia Pacific 1997 | The Scope for Productivity Improvement in Australia's Open Cut Black Coal Industry | Bench-marked 27 operations | Mining | Total factor productivity and other measures calculated. Low productivity and high labour costs in Australian mines. Overstaffing and idle time found to be main factors. |

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| Industry Commission 1994 | Urban Transport | Case study | Transport | Report into the performance of urban transport. Appendix D contains an analysis of productivity in Victoria, South Australia and Western Australia using partial and MFP measures. |
| Ritzman 1995 | Productivity in Australian Banking | Regression analysis | Banking | Compares growth accounting and partial productivity measures (1975 to 1994) with translog cost function regression analysis. Findings suggest productivity growth relatively ‘flat’ with two surges in the 1980s. |
| Lawrence *et al.* 1991 | The Comparative Efficiency of State Electricity Authorities | Growth accounting | Electricity | Uses translog multilateral MFP index (following Caves *et al.* 1982) to analyse productivity in electricity industry. Also investigates determinants (scale, output mix, centrality, transmission, fuel quality) of productivity. |
| Steering Committee for the Review of Commonwealth Service Provision | Two reports:<br>Data Envelopment Analysis (1997)<br>Measuring TFP of GTEs (1992) | Various | Various | Both of these reports provide a comprehensive review and the methods used along with a series of case studies on specific industries/firms/ providers (eg NSW correctional centres, NSW Road and Traffic Authority, Australian National, Melbourne Water, Australia Post). Previous reports by this Committee also contain substantial productivity analysis. |
| Bureau of Transport and Commun-ication Economics 1991 | An Analysis of Total Factor Productivity with an Application to Australian National | Case study of TFP growth | Australian National | Annual rate of growth of total factor productivity of 5.1 per cent between 1979–80 and 1887–88 (or 5.5 per cent taking into account returns to scale). Reductions in surplus staff and corporate restructuring important factors. |

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| **Workplace and firm level analysis** | | | | |
| Esho and Sharpe 1990 | X-Efficiency of Australian Permanent Building Societies, 1974–1990 | Stochastic frontier functions | Building Societies | 25 per cent average X-inefficiency found. Unsuccessful in finding determinants. |
| Crockett, Dawkins, Miller and Mulvey 1992 | The Impact of Unions on Workplace Productivity in Australia | Econometric analysis of AWIRS data | Work-place data | Negative union effects found (especially number of unions) controlling for a range of relevant factors. Dependent variable a 5 point subjective scale of self-assessed relative productivity by firms who measure productivity. Employee participation variables significant when unions not present. |
| Blanchflower and Machin 1996 | Product Market Competition, Wages and Productivity | Econometric analysis of AWIRS data | Work-place data | Use both United Kingdom and Australian version of WIRS to investigate competition and productivity. Find little evidence of link between productivity and competition. At the manufacturing level in Australia regression analysis suggests a positive link (higher competition — higher productivity). For Australia, find that exporters have higher productivity level. Also high profitability associated with high productivity. |
| Drago and Wooden 1992 | The Australian Industrial Relations Survey and Workplace Performance | Econometric analysis of AWIRS data | Work-place data | Negative ‘union voice’ effects found on five point scale of relative workplace productivity, in a multivariate analysis including a range of variables. |

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| **Industry level analysis** | | | | |
| Caves 1984 | Scale, Openness and Productivity in Manufacturing Industries | Regression | Industry level | Dependent variable industry level value added (VA) in Australia to VA in USA for 1977–78. Explanatory variables: capital (+), plant size (n/s), protection measure (-). |
| Mayes, Harris Lansbury 1994 | Inefficiency in Industry | Linear program-ming, SPF and regressions | Industry level | Uses stochastic production function method to investigate efficiency in various OECD countries. Australia data from 1977–78 Manufacturing Census for Australia, Harris (1992) method. Some regression analysis of determinants of inefficiency. For Australia, concentration (+), regional dispersion (+) and tariff protection (+) have significant influence on level of inefficiency. |
| Dixon and MacDonald, 1992 | A Decomposition of Changes in Labour Productivity in Australia: 1970–71 to 1989–90<br><br>(see also Dixon and McDonald, 1991) | Decomp-osition / growth accounting | Industry level | Decomposes labour productivity growth over 1971 to 1990 period. Major factors: increasing capital intensity, technological change. Slowdown in 1980's primarily due to reduction in capital intensity and stochastic factors in agriculture. |
| Pilat, Rao and Shepherd 1993 | Australia and United States Manufacturing: A Comparison of Real Output, productivity Levels and Purchasing Power, 1970–1989 | International comparison | Industry level | Census and national accounts for 1987 used to compare manufacturing productivity between Australia and United States. Australian labour productivity (per hour) 50 per cent of United States level. And increased in 1980's. For some sectors, capital intensity accounts for 50 per cent of gap, but in others not so. |
| Rao, Shepherd, Pilat 1995 | Real Output and Productivity in Australian Manufacturing: An International Perspective, 1970–89 | International comparison | Industry level | Similar to above, but some additional comparisons with Japan, Korea, Germany, Korea and Indonesia. |

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| Caves 1992 | Determinants of Technical Efficiency in Australia | Regression analysis | Industry | Cross-section of industry measures of inefficiency of 20 to 60 industries (derived from SPF method) in 1977.<br><br>Investigates concentration, diversification, protection, growth, imports, non-productive employees, size of plant, regional concentration, import costs. Finds efficiency increases with plant size and regional concentration and falls with protection from competition. |
| Bloch and Madden 1994 | Productivity Growth in Australian Manufacturing: A Vintage Capital Model | Vintage capital model | 34 industries<br>1955–1982 | Based on Salter (1966) model which gives a relationship between labour productivity, demand growth, wage/rental prices and labour saving technical change (underlying relationship is general equilibrium model of length of capital life). Find some support for model and, specifically, that demand growth, difference between wage and rental growth, and labour-saving technical change are positively related to productivity growth. |
| Phipps and Sheen 1993 | Unionisation, Industrial Relations and Labour Productivity in Australia: A Pooled Time Series/Cross Section Analysis of TFP growth | Econometric analysis of 15 industries for 15 years | ABS time series data combined with AWIRS cross-section data | Negative union effects on productivity levels but positive effects on productivity growth. Positive effects of industrial relations ‘enlightenment’ variables such as profit sharing, workers share ownership etc. |
| Managan and Regan 1983 | A Note on Organisational Slack and Market Power on Australian Manufacturing | Difference of means and *chi* square tests | ABS manufact-uring data | Statistical analysis of relationship between labour hoarding and market power. Industries in which firms possess significant market power tend to promote organisational slack. |
| **Sector and economy level analysis** | | | | |
| Dowrick 1993 | Wage Bargaining Systems and Productivity Growth in OECD Countries | Pooled cross-section time-series analysis for 18 countries for 30 years | OECD data | Analysis allowed for productivity gaps and found that more centralised and more decentralised wages systems tended to produce higher productivity growth. |

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| Gretton and Fisher 1997 | Productivity Growth and Australian Manufacturing Industry | MFP | ABS and IC data | Analyses productivity trends in the manufacturing sector. Uses adjusted prices (for effective rates of protection), also detailed discussion on the use and creation of a new capital series for manufacturing sub-division. |
| Hughes, Burgess and Dunlop 1991 | Neoclassical Formulations of Productivity Growth | Regression analysis | Economy level | Time series study of manufacturing productivity over 1970 (Qtr1) to 1989 (Qtr1). Find: labour productivity growth positively linked to output (Y) growth and change in real unit labour costs (RULC); and MFP growth positively linked to Y and RULC growth. Also incorporates utilisation proxies (survey responses). |
| Industry Commission 1994 | Research and Development Report (Appendix QB) | Regression analysis | Economy, sector level | Time series analysis 1975 to 1991. Regressed level of MFP on: Stock R&D (domestic, foreign), education. Sectoral regressions with addition of public R&D, external R&D, capital stock, infrastructure, Terms of trade, and education. |
| Otto and Voss 1992 | Public Capital and Private Sector Productivity: Evidence for Australia, 1966–1990 | Time Series | Economy, sector level | Private sector output per unit of capital and MFP. Stock of public capital significant and positive in determining private k/y and MFP (1966 to 1990). But cannot link public investment to productivity changes, and no indication of socially optimal level of public capital stock. Sectoral regressions largely unsuccessful. |
| Lowe 1995 | Labour Productivity Growth and Relative Wages: 1978–1994 | Various | Economy, sector level | Within and between sector decomposition of productivity (between sector effects are not significant). Considers measurement problems of retail and other sectors (hours worked issue). Looks at sectoral relationship between real wages growth and labour productivity (graphical evidence shows positive relationship). |
| Harris and Phillips 1984 | Productivity Trends in the Australia Manufacturing Sector | Regression | Economy, sector and international | 1954 to 1982 analysis of aggregate and industry level data on labour productivity and MFP. Variations across sectors important. Considers correlation between MFP, output, prices and real wages. |

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| Lattimore 1990 | The Productivity Performance of Australia Manufacturing | various including regression | Manufact-uring and industry | Review of productivity in Australian manufacturing, including discussion of 1980s performance. Regression analysis of slowdown of labour productivity in 1980s. |
| Savage and Madden 1997 | Australia Productivity Performance | Time series | Economy | 1950 to 1994 error correction model, with labour productivity as dependent variable. Explanatory variables include: physical capital, human capital, telephones per capita, trade openness, and export/import prices. All except human capital have a role to play. |
| Rogers 1995 | International Knowledge Spillovers | Regression | Economy Level | Dependent variable MFP. Assesses importance of domestic and foreign knowledge stocks (using both R&D and patent based methods). Domestic and foreign knowledge stocks significant explanators of MFP, these results based on using trade flows to proxy extent of knowledge flows. Also investigates business trips as a conduit of knowledge. |
| Dowrick 1990a | Australia (see also Dowrick 1990b) | Regression | Economy and sector level | Considers slowdown in 1980s. Decomposes slowdown into trend, cyclical and capital/labour ratio changes. Major results reported in main paper. Also considers Australia's international performance. |

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## **Discussant** — *Philip Hagan*

Peter Dawkins and Mark Rogers have done a commendable job in ploughing through the myriad Australian studies on productivity and summarising them — in terms of 'what is known about the determinants of productivity'. I do not know where they got the time to do all that reading.

Not surprisingly, the result is a round-up of the usual suspects. The studies variously point to the importance of:

- competition (including exposure to foreign competition) in terms of wonderfully concentrating the minds of bosses and workers alike;
- investment in capital and people (including public infrastructure investment);
- research and development, and innovation more generally;
- firm access to economies of scale and scope;
- the stage of the business cycle; and
- industrial relations/unionism/work practices.

### Physical versus economic measures of productivity

I for one have never been much attracted to purely physical measures of productivity, since I am never quite sure what the figures are meant to be telling us. Dividing physical (or constant price) measures of output by the number of employees (or by the number of 'productive employees' — or even by the number of hours worked) does not seem to get you very far; although such measures are quite popular (for example in the car industry).

Measures where both the numerator (output) and the denominator (inputs) are valued in constant price terms does, on the other hand, seem to get you somewhere. Again, I would take the example of the car industry because I am familiar with it — having traipsed through plants for nearly twenty years.

If your Australian workforce takes, say, 20 hours to assemble a car, whereas our United States counterparts take only 15, that looks bad — especially if both sets of workers have essentially the same kind of capital at their disposal (in the form of a more or less automated production line). But if the Australian workforce's wages is less than three-quarters that of their American counterparts (in terms of US dollars) then the wage bill will be actually less in Australia (and so other things equal we could still compete on price). On the other hand, if deficient physical effort is not offset by wage differentials then they are certainly not competing on the basis of price — but then again, as they say, beauty is in the eye of the beholder (especially sometimes in the case of mankind's continuing love affair with the car).

### Measurement issues

I note that the authors duck the tricky area of measurement problems, maintaining that 'these are not the subject of this paper'. Fair enough, and I guess this aspect was done to death yesterday. Yet it is difficult to draw strong inferences if the data on which analyses are based verge on a statistical nightmare. I remember, for example, when we were trying to do some international comparisons in an Industries Assistance Commission inquiry into heavy engineering and discovering that Australian dollar exchange rates jump around so much that international comparisons were futile if nominal exchange rates were used (I guess purchasing power parity rates are much more stable).

### Speculating about why productivity performance varies so much across industries

There is an open invitation in the paper for researchers to follow this issue up. I have one suggestion which might help. Look at wildly differing capacity utilisation rates as a possible explanator. Again, I would illustrate this point with the car industry.

An assembly line is installed and optimised for a particular throughput (and the higher the anticipated throughput the more it pays to automate particular tasks). Once commissioned, the productivity of the line will plummet if the plant is not operated at or very near design capacity (eg if demand is just not there). And car makers are notoriously optimistic about the share of domestic sales they will capture, even though they are generally realistic about the overall level of sales that will occur in a particular year.

Another obvious aspect of capacity utilisation is where identical plant and equipment is being operated around the world around the clock versus on only a one- or two-shift basis in Australia (eg because of slack demand or because of penalty rates for labour). Again, in such circumstances Australia is likely to show up in a poor light — especially on physical measures of productivity.

### Unions and productivity

The suggestion that it is an empirical issue as to whether unions affect productivity positively (the collective voice face) or negatively (the monopoly face) I find quaint. It reminds me of when all the macroeconomic models in

Australia fell over following the hitherto uncharted territory traversed by the economy following the oil shocks of the early and late 1970s. My strong suspicion is that there is just not enough ‘information’ contained in Australian economic statistics to discriminate in any decisive fashion between quite different theories of how the economy works. If that is a correct supposition, debates like the role of unions in productivity performance will continue to rage without resolution.

## A final observation

The observation that ‘reallocation [of resources] across industries accounts for a small proportion of the total growth in productivity’ would be something of a cold comfort for the Industry Commission/Productivity Commission. However, the Caves *et al.* finding that ‘the level of tariff protection in Australian industries adversely affects efficiency’ would, of course, have the opposite effect.

## **Discussant** — *Philip Lowe*

Peter Dawkins and Mark Rogers produced a comprehensive overview of productivity studies in Australia. They have summarised a very large volume of literature and have placed quite diverse studies in a framework that is easily recognisable and understandable. They have also identified the major influences on productivity growth in Australia, although the list of factors that actually influence productivity growth is undoubtedly larger than the list that they discuss.

Each of us at this Conference would probably have their own special factors that they think Dawkins and Roger's review should have included, and I suspect that each of us could point to a few studies that back up our own views. On this score, I am no different. Befitting my position as a central bank economist, my special factor would be macroeconomic stability, in particular low inflation and a sound banking system.

I would like to make comments in three areas. First, I will discuss briefly what we learn from the paper. Second, I will discuss why the central bank is concerned about productivity growth. And third, I will make some remarks about the link between employment growth and productivity growth.

So what did we learn from the paper? Here I would like to focus on general points, as the specific influences on productivity growth identified in the various studies have already been discussed.

The first general point is that, in many cases, it is difficult to distinguish between changes in levels and growth rates of productivity. While it is useful to distinguish between the two concepts at a theoretical level, at a practical level it is very difficult to do so, with most studies struggling to distinguish convincingly between changes in growth rates and levels. In part, this is because many productivity reforms take years to reach their full effect.

Another general point is that there are big differences in the levels and growth rates of productivity across industries and across firms. In the retail trade sector, the average labour productivity growth rate for the last 20 years has been less than 1 per cent per annum. In the communications industry, the comparable figure is above 8 per cent. In passing, I would like to agree with the point that Ian Castles makes that these differences in productivity growth are not, by themselves, a justification for differences in wage growth across industries; instead, they are a justification for relative price changes (Chapter 2). Too often the macroeconomic relationship between productivity growth and wages is translated inappropriately to the microeconomic level.

In terms of levels of productivity, there are also large differences across industries. In the mining industry, the average level of labour productivity is four times that in many service industries. What is more striking is that the level of productivity differs tremendously across firms in the same industry. An interesting issue for research is how these big differences can be sustained for many years in a competitive environment.

The final general point I wish to note is that there are large measurement errors arising from conceptual difficulties regarding what constitutes ‘output’ and from the way the statistics are collected. My favourite example relates to the deregulation of shopping hours. Over the second half of the 1980s, there was virtually no growth in productivity in the retail trade sector. This is despite very strong growth in demand, scanning technologies becoming widespread, rationalisation of the industry and new stock control techniques. The main explanation is that shopping hours were deregulated and the average opening hours increased by around 20 per cent. This required more people to be employed but, in the end, there was no increase in the number of goods sold. However, as many people could attest, the elimination of the Saturday morning rush to the shops made life that little bit easier. This extra convenience, however, is not counted as extra output, although arguably the output of a service has increased.

The second issue I would like to comment on is why is it that the central bank is interested in productivity growth. Catherine Morrison said that if you are trying to measure productivity growth, the first question you should ask yourself is: ‘What is the goal?’ (Chapter 2) The first answer that I would give, at least from the central bank’s perspective, is that it is very important in our forecasting framework. I hope it comes as no surprise to anyone here that we have an inflation target with a midpoint of 2.5 per cent, and that we operate monetary policy in a forward-looking way. This requires us to forecast inflation. We do this using various approaches, one of which is using a range of mark-up models in which prices respond to developments in unit labour costs and the exchange rate.

In this framework, estimating the rate of labour productivity growth is critical to one’s assessment of future unit labour cost growth. If labour productivity growth is forecast to be 2.5 per cent per annum, then wages growth of 5 per cent per annum is consistent with our inflation target, but if productivity growth is just 1 per cent, then ongoing wages growth of 5 per cent per year is clearly inconsistent with the target. One of the critical issues that has been debated within the Reserve Bank, and within the wider community, is whether or not the pick-up in productivity growth that we have seen over the past 5 or 6 years reflects structural or cyclical factors, and what it means for wages growth and inflation.

The second reason that the Reserve Bank is interested in productivity growth is that monetary policy can itself contribute to productivity growth. Although in the literature there is an active debate about what impact inflation has on economic growth, there is a broadly-based consensus, backed up by strong empirical work, that inflation rates above 8 to 10 per cent have a clear negative effect on growth. For lower inflation rates the evidence is more mixed, with some studies finding a significant negative relationship between productivity growth and inflation and others finding no significant relationship.

I think I have read about 40 studies that look at the issue and my brief summary of the empirical evidence is that a 1 percentage point reduction in the average rate of inflation might add between 0.03 and 0.05 per cent to GDP growth. That means that a 5 percentage point reduction in inflation, which is basically what we have seen in Australia over the past decade, might add around 0.2 per cent to steady state productivity growth. Other studies suggest that low inflation affects the level of GDP, rather than the growth rate of GDP. Work in the United States by Martin Feldstein and others suggests that a 1 percentage point reduction in inflation adds half a per cent to the level of GDP in perpetuity. For my taste, this number seems a little high, but I think the general point coming out of these studies is right: low and stable inflation increases the potential output of the economy and this may take quite a few years to be seen fully in the data.

I would like to conclude by making an observation on the relationship between unemployment and productivity growth.

The top panel of Figure 7.D1 shows the standard measure of labour productivity growth (that is, output divided by hours worked). The slowdown in productivity growth in the second half of the 1980s is very clear. Figure 7.D2 shows a different measure of productivity growth, where output has been divided by the *potential* workforce rather than total hours worked. Using this measure, the second half of the 1980s does not look so bad. Productivity growth slowed down a little, but not to the same extent as the standard measure suggests. The difference in the two measures arises from the fact that during the second half of the 1980s, employment grew rapidly. While the additional workers were producing extra output, on average, they were producing less output than those already employed, depressing the standard measure of productivity growth. Conversely, when the unemployment rate is rising, the standard measure shows stronger productivity growth.

Figure 7.D1: **Labour productivity in the non-farm sector, June quarter 1978 to December quarter 1997**
(index June quarter 1978=100)

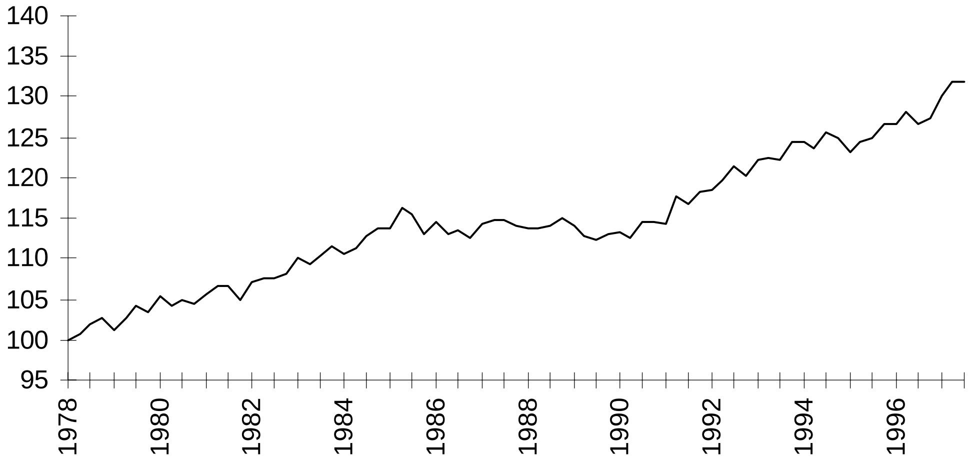
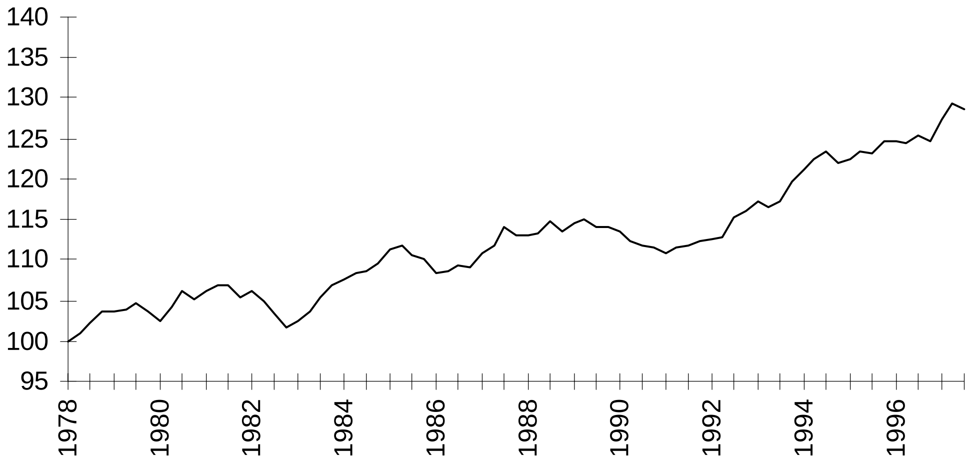



Figure 7.D2: **Output per potential worker in the non-farm sector,[a] June quarter 1978 to December quarter 1997**
(index June quarter 1978=100)




a Labour supply defined as labour force plus those not in the labour force seeking work.
*Sources*: ABS Cat. Nos 5206.0 and 6203.0.

Arguably, one of the factors most retarding productivity in Australia is the fact that there are thousands of unemployed workers who are producing no measured output. As was the case in the 1980s, creating jobs for these workers through wage restraint may act to slow the standard measure of productivity growth from its relatively rapid pace over the past few years. While undoubtedly underlying productivity growth has picked-up over the past decade, a slowing in productivity growth associated with rapid employment growth should not be seen automatically as a bad thing. It may well be a sign that Australia is making more productive use of *all* its resources.

## General discussion

The discussion focussed on the following themes:

- the goals of microeconomic reform;
- scale economies and competition; and
- the need for a broad perspective in assessing growth.

### The goals of microeconomic reform

One participant cautioned against focussing on policies that were simply aimed at maximising productivity. In a broader framework, microeconomic reforms are implemented with the aim of improving the economic welfare and this objective does not always correspond with the narrower objective of improving productivity. It is quite possible for reforms to be beneficial without improving productivity. The example of Saudi Arabia in the 1970s was provided. That country displayed a decline in real (constant price) productivity over that period, halving oil production from 100 million barrels a day to 50 million barrels a day. However, as a nation it became very wealthy in the process, with the price of oil rising by about a factor of 50 over the same period. One aim of microeconomic reforms is the removal of obstacles to resource movements. Reform would then permit the flow of resources from areas facing low world prices or low domestic consumer valuations, to areas of high world prices or high domestic consumer valuations. The reforms would improve welfare regardless of their effect on aggregate productivity.

### Scale economies and competition

It was observed that one of the big issues for Australia, in terms of population and geography, was that of the relationship between economies of scale, industry concentration, competition and national economic welfare. However, there is a fundamental tension between the price lowering incentives provided through increased competition and the price lowering incentives provided by the lower average costs (eg through industry concentration and scale economies). Because of these tensions, achievement of a more competitive environment may not necessarily lead to the expected improvements in cost effectiveness. It is therefore important to examine evidence relating to the positive and negative effects of reform.

The balance of benefits from scale economies on the one hand and improved competitiveness on the other is unresolved in the United States literature. However, it was noted that a further tension existed in the United States literature as evidenced by differences in the results from disaggregate as compared with aggregate studies. Studies that utilise micro-level data tend to provide evidence for the existence of scale economies and other forms of cost economies. This is suggestive of the possibility of static efficiency losses associated with the break up of larger organisations into smaller units. However, studies that utilise macro-level data tend to find evidence of diseconomies of scale, suggesting that breaking up larger organisations into a number of smaller ones may improve cost efficiencies. These two results have not yet been reconciled.

## The need for a broad perspective in assessing growth

One participant reflected on the need to extend analysis beyond the standard determinants of growth — an economy's stock of labour and capital — to take account of institutional settings and geographic factors. The work of Mancur Olsen was mentioned as being important in this respect. The stability of property rights and financial institutions were provided as examples. It was suggested that recent High Court rulings on the existence of native title in Australia may have increased uncertainty about the security of property rights in some industries. The uncertainty of property right ownership was considered to be the fundamental issue, rather than the question of who owned the property rights to particular resources. The natural resource endowment of particular countries was also considered to be an important factor. If analysts adopt a broad view of welfare, a number of factors in addition to productivity growth should be included in assessments of economic performance.

# 8 TRADE LIBERALISATION AND MANUFACTURING INDUSTRY PRODUCTIVITY GROWTH

*Satish Chand, Paulene McCalman and Paul Gretton*[1]

## 8.1 Introduction

An important component of microeconomic reform has been the on-going review of border assistance arrangements. This review began in earnest in 1971 and was followed shortly afterwards by a 25 per cent across the board tariff cut in 1973 (Industry Commission 1998). Through a process of general and industry specific reviews, assistance to manufacturing has steadily declined. Over the last decade, border assistance to manufacturing has been rationalised in a series of major policy statements. The Economic Statement in May 1988 introduced a 4-year phased tariff reduction program. That program was extended by the Building a Competitive Australia Statement in 1991 and the Working Nation Statement in 1994. Through this review process, most tariffs have been reduced to 5 per cent. Exceptions have been made for textiles, clothing, footwear and leather goods (TCF), and passenger motor vehicles (PMV).

The assistance review has been strongly supported by theoretical and empirical investigations demonstrating that although the assisted sector may benefit, this benefit is only available at a greater cost to the community as a whole. Measures of nominal and effective rates of assistance provided an analytical focal point for the assistance reviews (Corden 1971 and Balassa 1971) while economy-wide analyses provided measures of the national and inter-industry effects of assistance (Powell and Lawson 1990 and Dee 1994). However, there has always been a feeling that general equilibrium model estimates of comparative static gains from tariff reductions omit important dynamic benefits

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[1] Satish Chand undertook initial research for this study while on secondment with the Industry Commission in 1997. His affiliation at that time was the Research School of Pacific and Asian Studies, ANU. The authors would like to acknowledge the helpful comments and assistance provided by Philippa Dee, Damien Eldridge, Chris Harris, Ralph Lattimore and John Salerian in the preparation of the paper, and by the discussants to the paper.

believed to be associated with trade liberalisation. Empirical evidence of such dynamic effects has been scant.

More recently, there has been a resurgence of interest, generally associated with the work of Romer (1986) and Lucas (1988), in the development of theoretical frameworks for explaining the determinants of long-run growth and the influence of government policies on that growth. There is also a substantial and growing body of empirical evidence suggesting more liberal trade policies and trade openness are associated with faster growth (eg World Bank 1987, Edwards 1993 and Dowrick 1994).

Trade liberalisation in the Australian manufacturing sector has now been in progress for nearly three decades. It is now opportune to examine the influence of trade policies on growth, in the Australian context. This is done using a new database containing information on the growth in industry outputs, inputs and the level of assistance over the liberalisation period. It has also been possible to establish complementary series on the key determinants of growth, such as the accumulation of human capital and knowledge. This paper provides an empirical analysis of the determinants of growth in the manufacturing sector, using the new industry data base and associated series.

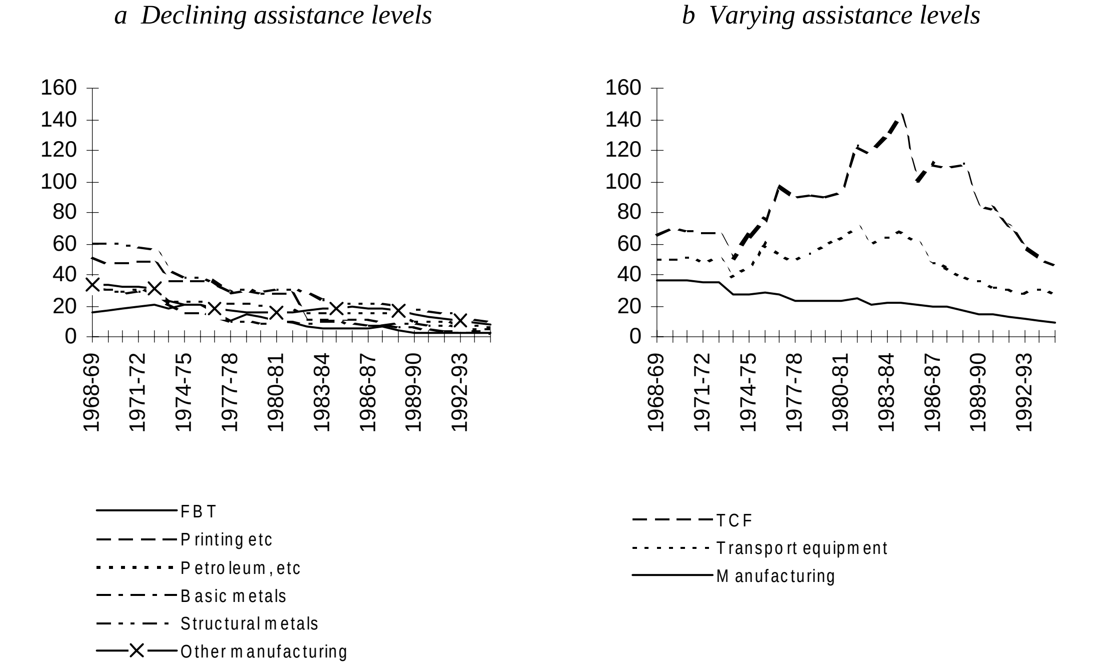
This paper is structured as follows. Section 8.2 provides background information on assistance changes and growth in manufacturing. The next section describes the growth model adopted in the study and the key assumptions underlying the application of this model, together with the statistical model applied in the econometric analysis. Section 8.4 sets out the data sources for the analysis, while section 8.5 reports the main finding of the analysis. Special attention is given to a review of key data used in the model, examination of the assumptions underlying the model and the robustness of the estimated effect of assistance changes on growth.

Key findings of the analysis are that declining assistance is positively related to manufacturing industry productivity growth, and that this relationship is not sensitive to changes in alternative data series or econometric techniques.

## 8.2 Manufacturing sector assistance

There were some substantial differences in the level of assistance afforded manufacturing industry subdivisions in 1968–69 (Figure 8.1a). Nevertheless, the broad pattern of assistance reductions over the 26 years to 1994–95 has been similar for most activities . Exceptions to this experience are the TCF and transport equipment industries, for which assistance has varied considerably over time (Figure 8.1b).

Figure 8.1: **Effective rates of assistance by manufacturing industry subdivision,[a] 1968–69 to 1994–95**




FBT Food, beverages and tobacco.

TCF Textiles, clothing, footwear and leather goods.

a The effective rate of assistance is defined as the percentage change in returns per unit of output to an activity's value-adding factors due to the assistance structure.

*Source*: Productivity Commission estimates.

With different starting levels and patterns of assistance change, relative assistance afforded individual industries has changed substantially over the past 3 decades. For example, the ratio of assistance to TCF and transport equipment relative to the manufacturing average increased from 1968–69 to 1994–95 (Table 8.1). On the other hand, assistance to Structural metal products, and Printing, publishing and recorded media was high in 1968–69, but fell to below manufacturing average levels by the end of the period.

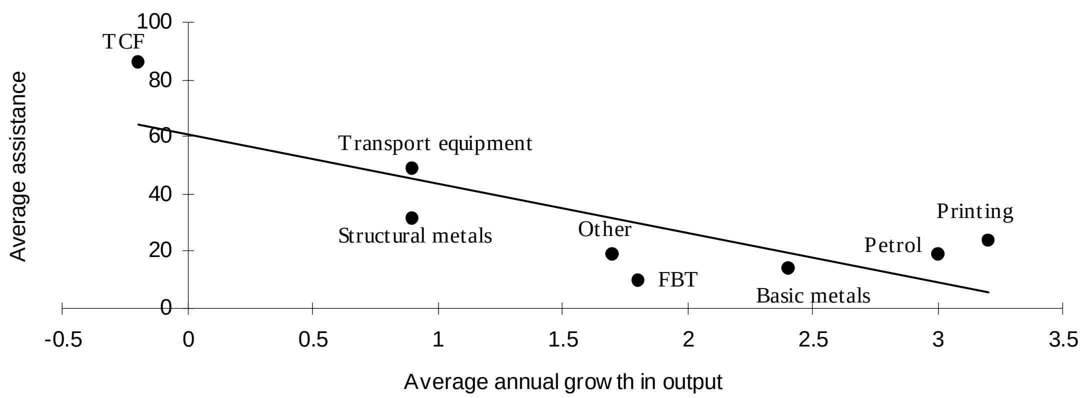
Table 8.1: **Assistance levels relative to the manufacturing average by manufacturing industry subdivision, 1968–69 to 1994–95**

| *Industries* | *1968-69* | *1975-76* | *1981-82* | *1988-89* | *1994-95* |
|---|---|---|---|---|---|
| Food, beverages and tobacco | 0.4 | 0.7 | 0.3 | 0.2 | 0.2 |
| Textiles, clothing, footwear and leather goods | 1.8 | 2.7 | 4.9 | 6.5 | 5.1 |
| Printing, publishing and recorded media | 1.4 | 1.3 | 1.1 | 0.4 | 0.3 |
| Petroleum, coal, chemicals | 0.8 | 0.8 | 0.7 | 0.9 | 0.7 |
| Basic metals products | 0.9 | 0.6 | 0.4 | 0.5 | 0.6 |
| Structural metals products | 1.7 | 1.4 | 1.3 | 1.2 | 1.1 |
| Transport equipment | 1.4 | 2.1 | 2.8 | 2.2 | 3.1 |
| Other manufacturing | 0.9 | 0.7 | 0.6 | 1.0 | 0.8 |

*Source*: Productivity Commission estimates.

Over the same period, a negative correlation between the level of assistance and average annual output growth is evident (Figure 8.2). However, there are many other factors besides industry assistance that can influence industry growth. This study uses information about the growth in labour and capital inputs, and changes in the operating environment of industries to disentangle the relative importance of assistance and other factors to industry output growth.

Figure 8.2: **Relationship between average assistance and average annual growth by manufacturing industry subdivision, 1968–69 to 1994–95**




*Source*: Based on Gretton and Fisher (1997).

## 8.3 Model

The basic neoclassical growth model, used as a basis for this study, is derived from a production technology that specifies output as a function of labour and capital:

$Y = F(L, K)$ (8.1)where $Y$ is output, and $L$ and $K$ are measures of the value adding factors labour and capital, respectively.

This model only provides a partial representation of the production technology. As specified, it fails to capture the possibility of improved labour and capital productivity resulting from technological change and better organisation of production (arising from new knowledge and learning by doing). One method of incorporating this possible source of growth is to include a productivity parameter ($A$):[2]

$$Y = AF(L, K) \tag{8.2}$$

where $A$ represents exogenous technical change.

Further insights into the growth relationship can be obtained by disaggregating output growth into growth in inputs (labour and capital) and productivity. This growth accounting exercise usually assumes constant returns to scale in labour and capital inputs. Furthermore, assuming competitive pricing in factor markets and payment to factors according to their marginal products, the elasticity of output with respect to labour and capital can be interpreted as that factor's share of output.

In this adjusted model, the productivity parameter is used to explain all sources of growth not accounted for by growth in measured labour and capital. However, this model does not explicitly link output growth with other factors, besides labour and capital, that determine the operating environment.

In order to account directly for other influences in the production technology, this study explicitly includes other factors within the production framework. To do this, the basic model (equation 8.1) is extended by introducing a series of factors that may potentially explain the changes in productivity and therefore output. The general form of this production function may be written as:

$$Y = F(L, K; \mathrm{Z}) \tag{8.3}$$

where $\boldsymbol{Z}$ is a vector of other factors that affect productivity and hence output.

2 This approach is attributed to the seminal articles of Solow (1956) and Swan (1956) and has provided the basis of the extensive growth accounting studies and official estimates of the contribution of multifactor productivity to growth in output.

Despite attempts that may be made to fully explain the production technology and the determinants of output growth, it is likely that some variables will be omitted in empirical work and that some of the variables included are measured imprecisely. For these reasons, the final model adopted in this study retains a 'productivity' parameter (*A*).[3] The final general representation of the technology of production adopted in this study is:

$$Y = AF(L, K; Z) \tag{8.4}$$

The growth relationships between inputs and output can be derived by differentiating equation (8.4) with respect to time to yield:

$$\frac{dY}{dt} = F\frac{dA}{dt} + A\frac{\partial F}{\partial L}\cdot\frac{dL}{dt} + A\frac{\partial F}{\partial K}\cdot\frac{dK}{dt} + A\frac{\partial F}{\partial Z}.\frac{dZ}{dt} \tag{8.5}$$

Dividing equation (8.5) through by *Y*, the level of output, to show changes per unit of output, and multiplying the terms on the right hand side by $1 = \frac{L}{L} = \frac{K}{K} = \frac{Z}{Z}$ gives the expression:

$$\frac{dY}{dt}\frac{1}{Y} = \frac{1}{A}\frac{dA}{dt} + \frac{\partial F}{\partial L}\frac{L}{F}\frac{1}{L}\frac{dL}{dt} + \frac{\partial F}{\partial K}\frac{K}{F}\frac{1}{K}\frac{dK}{dt} + \frac{\partial F}{\partial Z}\frac{Z}{F}\frac{1}{Z}\frac{dZ}{dt} \tag{8.6}$$

By defining the proportional growth in output, capital, labour and other factors as $\hat{Y}, \hat{K}, \hat{L}, \hat{Z}$ and $A = A_0 e^{\lambda t}$ with $\lambda = \frac{1}{A}\frac{dA}{dt}$, equation (8.6) can be simplified to:

$$\hat{Y} = \lambda + \beta_L \hat{L} + \beta_K \hat{K} + \beta_Z \hat{Z} \tag{8.7}$$

where $\beta_j = \frac{\partial F}{\partial j}\frac{j}{F}$ for $j = L, K, \boldsymbol{Z}$

The $\beta_j$s are the elasticities of output with respect to the corresponding input (assuming no change in other inputs).[4]

This model (equation 8.7) represents a more general formulation of the traditional neoclassical growth model (equation 8.2). Nevertheless, the traditional model can be easily represented in this general model by the restriction $\beta_Z = 0$. The traditional assumptions of constant returns to scale in

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[3] The productivity parameter (*A*) in the extended model will differ, both theoretically and empirically, from a productivity parameter in the basic neoclassical model because of the inclusion of the additional factors (***Z***) in the model.

[4] By estimating the model in growth rates, the deterministic and stochastic trends in the original data are removed. However, with this approach there is a loss of information on the co-movement of variables when measured in levels.

labour and capital inputs and competitive factor markets are retained in the current analysis. This assumption enables information about factor shares to be used in the estimation process (see below).

In growth accounting studies, it is normally found that multifactor productivity makes a positive contribution to recorded output.[5] In keeping with this general finding, the inclusion of other factors (***Z***) in the production technology will normally be associated with increasing returns to scale over all inputs (including value adding and other factors). The source of increasing returns to scale is assumed to stem from externalities associated with the other factors.[6]

For the purposes of estimating equation (8.7), the other determinants of output growth included in the vector ***Z***, need to be defined and measured. Recent theoretical and applied studies are used as a guide to 'growth theory' variables that should be included. This study is therefore moving into the territory of new growth mechanisms by relating environmental factors to sectoral output.

The level of industry assistance has an important influence on the operating environment of individual industries and is the focus of the current analysis. On the one hand, assistance has a reallocation effect that favours output and employment in assisted activities. On the other hand, trade barriers can be instrumental in slowing the flow of new ideas and knowledge and reducing specialisation and lowering growth (Grossman and Helpman 1991, Rivera-Batiz and Romer 1991, Romer 1994). Additionally, trade restrictions may encourage redundancy in research if they cause the same specialised input or idea to be discovered more than once. Redundancy of effort could reduce the number of unique specialised ideas and inputs available, potentially lowering growth.[7]

Lee (1993) and EPAC (1996) found, in multi-country analyses, that trade policies that restrict the availability of imports through tariffs or quotas are associated with lower national growth. The World Bank (1987) and Dowrick (1994) also found that trade openness is positively related to national growth. However, Levine and Renelt (1992) in their sensitivity analyses of

[5] This finding is not universal. Refer to Gretton and Fisher (1997) for examples.

[6] Clearly, if other influences on the operating environment of individual sectors have a net negative effect on recorded output, decreasing returns would be evident (and in the conventional growth accounting studies, estimates of multifactor productivity would be negative).

[7] Arguments of so called X-inefficiency (Liebenstein 1966, 1978) also reflect on the possibility of productivity losses due to workers and managers diverting effort away from activities designed to innovate and increase efficiency in internationally competitive activities. Potentially any increase in X-inefficiency could lower productivity and growth.

sources of cross-country growth, found that their trade restrictiveness variable was not robust in explaining variations in output growth across countries.

The current analysis focuses on the relationship between border restrictions on trade and growth for manufacturing industries in Australia. The Industry Commission's nominal rate of assistance by industry is adopted as the measure of border restrictions on trade ($\tau$). The nominal rate of assistance to output is defined as 'the percentage change in gross returns per unit of output relative to the (hypothetical) situation of no assistance' (Industry Commission 1995a). The rates applying to individual activities can be directly observed by firms who make their business plans accordingly. The nominal rates rather than effective rates define the directly observable operating environment of industries and, of the two assistance measures, are more likely to influence behaviour.

For a given level of assistance, R&D can be instrumental in generating output growth by providing new technologies and applications (Romer 1986, 1987 and 1990, Grossman and Helpman 1991, and Aghion and Howitt 1992). In these models, technological advancement and growth depend on R&D activity, with this activity being rewarded by some form of ex post monopoly profit. Providing there is no tendency for an economy to lose access to new ideas, growth can remain positive in the long run. In addition, it is generally assumed that knowledge is non-rival so that knowledge spills over to other producers. General evidence of a positive relationship between R&D and productivity growth was found in Englander et al. (1988), Coe and Helpman (1993), and Griliches (1994). Similar evidence was found in Industry Commission (1995b) using Australian data for the sample period 1975–76 to 1990–91. The Industry Commission study found that the stocks of domestic and foreign R&D were individually significant in explaining growth in output at the national level, and growth in multifactor productivity for the manufacturing sector.[8]

In the current study, the stock of domestic, economy-wide R&D has been included as an additional factor. Assuming that knowledge acquired in previous periods is instrumental in raising current period output, R&D stocks rather than current period expenditures are adopted as the appropriate measure of R&D knowledge inputs to production.[9]

8 The Industry Commission study of manufacturing productivity involved a two step method. In the first step, multifactor productivity was estimated using conventional growth accounting procedures. In the second step, the determinants of productivity growth were estimated econometrically. A two step method was also used by Englander *et al.*, Coe & Helpman, and Griliches.

9 R&D stocks are measured at the beginning of the year.

In addition, Australian productivity may be enhanced by the stock of foreign knowledge. Such stocks may act as a direct input to production and as a complement to domestic R&D. In principle, it would be desirable to expand the analysis to include foreign R&D stocks. In practice, a series of foreign R&D is not available for the period covered by the current analysis.[10]

While foreign R&D may have a direct impact on productivity in Australia, the diffusion of new research can also be facilitated by international trade in tangible commodities, particularly capital. When this occurs, intra-industry trade in capital equipment may serve as an indicator of the international transfer of knowledge in new technologies and production processes. Backus, Kehoe and Kehoe (1992), in a cross country study of the presence of scale effects in manufacturing, found a positive relationship between intra-industry trade and manufacturing industry growth. The current study includes intra-industry trade in capital equipment as a separate explanatory variable for output growth in each sector. Intra-industry trade for the transport equipment and other manufacturing sectors (including 'other machinery and equipment') over the sample period is used to proxy intra-industry trade in capital equipment. The extent of intra-industry trade (IIT) is measured by the Grubel-Lloyd index:

$$IIT = \frac{\sum_i \left( X_i + M_i - \left| X_i + M_i \right| \right)}{\sum_i X_i + \sum_i M_i}$$

over all capital goods *i*. The $X_i$ and $M_i$ are the exports and imports of capital goods *i*, respectively.

Education and learning by doing can also be instrumental in generating output growth by: increasing the productivity of raw labour inputs (hours on the job); contributing to knowledge accumulation; and facilitating the transfer of skills between activities (Lucas 1988, Young 1991, and Yang and Borland 1991). Conventionally, labour inputs are measured in terms of the time spent at work (eg hours worked). They do not account for possible improvements in labour quality coming from human capital accumulation, and spillover benefits for firms operating in an environment with a more educated work force. To take account of the effects on output growth of education and learning by doing, the stock of human capital (*H*) is included in the analysis. This measure is proxied by the proportion of the national work force with post-secondary school qualifications. It is assumed that a more educated work force is also capable of

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10 The series used in Industry Commission (1995b) was sourced to Coe and Helpman (1993) and covered the period 1976–77 to 1990–91.

higher levels of specialised labour input and is better able to adapt to new production technologies.

The role of public infrastructure in growth has been highlighted by Aschauer (1989), Barro (1990), Otto and Voss (1994, 1996). These studies suggest that public capital complements private capital so that public capital accumulation may be instrumental in increasing the productivity of private capital, raising output growth. A criticism of empirical work investigating the link between public sector accumulation and growth is that there may be reverse causality, with higher levels of industry output leading to increased demand for infrastructure. Otto and Voss (1996) investigated the direction of causality and found some evidence against the claim that the causality runs from private output to public capital. In the current study, public capital ($G$) is included as another factor of production, to allow for the possibility that it has a positive impact on output growth.

Incorporating the above variables into equation (8.7) gives the following estimation equation:

$$\vec{Y}_{it} = \lambda + \beta_L \vec{E}_{it} + \beta_K \vec{K}_{it} + \beta_\tau \vec{\tau}_{it} + \beta_R \vec{R}_t + \beta_M \vec{M}_t + \beta_H \vec{H}_t + \beta_g \vec{G}_t \qquad (8.8)$$

where $i$ denotes industry and $t$ denotes time. All variables included in the analysis are described in Table 8.2. In its present formulation, the model shows the effect of a change in a variable (such as assistance) on the level of output, other things being equal. It does not, however, show the interaction between variables or the effect of discrete changes in environmental variables on the rate of growth of output.

## 8.4 Data

The extended production function (equation 8.8) was estimated using annual data for eight 2-digit Australian and New Zealand Standard Industry Classification (ANZSIC) Australia manufacturing industries, over the period 1968–69 to 1994–95.

Data on industry outputs, and capital and labour inputs have been drawn from an Industry Commission database covering ANZSIC 2–digit manufacturing (Gretton and Fisher 1997). The remaining items have been assembled as part of the research undertaken for this study. Measures of assistance have been drawn from the Commission's assistance evaluation data base. Other industry and economy-wide variables, have been derived from published and unpublished information provided by the Australian Bureau of Statistics (ABS) (Appendix 8A).

Table 8.2: **Variables used in regression analysis**

| *Variable* | *Symbol* | *Description* |
|---|---|---|
| Output | $Y$ | Gross product at factor cost, in constant 1989–90 prices for each 2-digit manufacturing industry. [a] |
| Labour | $L$ | Annual hours worked, for each 2-digit manufacturing industry. |
| Capital | $K_1$ | Capital capacity of machinery and equipment, in constant 1989–90 prices, for each 2-digit manufacturing industry. |
| | $K_2$ | Capital capacity of non-dwelling construction, in constant 1989–90 prices, for each 2-digit manufacturing industry. |
| Assistance to industry | $\tau$ | Nominal rate of assistance for each 2-digit manufacturing industry. |
| Domestic R&D | $R$ | Stock of R&D undertaken by the domestic private and public sectors, in constant 1989–90 prices, economy-wide. |
| Trade in intermediate capital goods | $M$ | Grubel-Lloyd intra-industry trade index for other machinery and equipment, and transport equipment. |
| Human capital | $H$ | Proportion of the labour force with post-secondary school education, economy-wide. |
| Public infrastructure | $G$ | General government stock of net public capital (including non-dwelling construction and equipment) in constant 1989–90 prices, economy-wide. |

a Output is valued at unassisted prices. See ensuing discussion and Appendix 8B.

*Source:* See Appendix 8A for discussion of sources and methods.

The industry subdivision classification used differs slightly from the standard 2-digit ANZSIC (Table 8.3). The industry classification was defined to provide details for as many industry subdivisions as possible, over the longest period possible. The database finally assembled covers eight subdivisions over the period 1968–69 to 1994–95. In addition, industries that have historically attracted higher than average levels of government support through assistance and other measures are included separately. Classifying industries in such a way aids in disentangling the effect of assistance changes on industry output over the last three decades.

## Table 8.3: **ANZSIC based industry classification for the manufacturing sector**

| *ANZSIC number* | *ANZSIC description* |
| --- | --- |
| 21 | Food beverages and tobacco (FBT) |
| 22 | Textiles, clothing, footwear and leather (TCF) |
| 24 | Printing, publishing and recorded media |
| 25 | Petroleum, coal, chemicals and associated products |
| 271,2,3 | Basic metal products |
| 274,5,6 | Structural metal products |
| 281,2 | Transport equipment |
| | Other manufacturing, *including:* |
| 23 | Wood and paper products |
| 26 | Non-metallic mineral products |
| 283, 4,5,6 | Other machinery and equipment |
| 29 | Other manufacturing |

*Source:* Gretton and Fisher (1997).

The measure of manufacturing industry output used in this study is value added at factor cost (also referred to as industry gross product) in constant prices. Value added is measured by subtracting material inputs from gross output. Traditionally, output is deflated from current prices to constant prices using domestic transactions price ratios (ie at assisted prices). However, to preserve the independence of the explained variable (output) and the explanatory variables (including assistance) and draw inferences about the underlying social value of productivity and output growth, it is more meaningful to deflate output to unassisted prices. This valuation approach may be illustrated using a profit function framework, where:

$$\pi = P_d F(L,K) - wL - rK \tag{8.9}$$

With zero pure profits and a competitive market equilibrium:

$$P_d F(L,K) = wL + rK \tag{8.10}$$

In traditional analysis, output is valued in terms of domestic market prices ($P_d$) while $w$ and $r$ are assumed to be equal the marginal products of labour and capital, respectively. However, in the presence of industry assistance (measured by$\tau$):

$$P_d = P_w(1+\tau) \tag{8.11}$$

where $P_w$ is the unassisted price of a unit of output. Thus, when domestic output is evaluated at 'constant domestic prices' the resulting constant price measure retains the price effects of assistance. After indexing $P_w$ to 1, these price effects can be eliminated by substituting equation (8.11) into (8.10) and dividing both sides by *(1+τ)* to give:

$$Y = F(L,K) = \frac{1}{1+\tau}\left(wL + rK\right) \qquad (8.12)$$

where $Y$ is the unassisted value of output adopted in this study. In this set up, the price effects of assistance changes are eliminated from measures of real output growth. The implications of this approach for assessing changes in productivity are presented in Appendix 8B. Using such measures, real productivity growth is lower than conventionally measured when assistance is rising and higher than conventionally measured when assistance is falling.

## 8.5 Results

Estimating the production model using the new industry data was achieved in a two step process. First, the standard neoclassical growth model (equation 8.2) was estimated and cost share information was used to check the assumption of constant returns to scale in those inputs. Secondly, the extended model inclusive of labour and capital and growth theory variables was estimated. The steps in the econometric analysis and findings are reported below. Special attention is given to the labour and capital input series. Special attention is also given to the sensitivity of the estimated parameter on assistance to alternative data inputs.

### 8.5.1 The basic model

Initially, a model including only value adding inputs (ie with $\beta_z$=0) was estimated for each manufacturing subdivision using OLS and pooled OLS for the panel of eight industry subdivisions, for the period 1968–69 to 1994–95 (Table 8.4). The panel estimates indicate labour is the only input that significantly influenced output in manufacturing over 1968–69 to 1994–95. In comparison with industry cost shares calculated directly by Gretton and Fisher (1997), the estimated coefficients on labour tend to be high.[11] The industry regression results are consistent with the panel results, with estimated coefficients on labour being particularly high for TCF (1.18) and other machinery (0.96) relative to corresponding average cost shares. However, the estimated elasticity on labour for the Food, beverages and tobacco industry

[11] Because of high standard errors most of the estimated coefficients are not significantly different from the basic data cost shares at the 5 per cent level. For the same reason, the coefficients provide poor indicators of industry technology, given available information.

(FBT) subdivision is negative. If accepted at face value, it would imply that a one per cent reduction in the number of hours worked would increase output by 0.1 per cent.

Table 8.4: **Estimated coefficients on labour and capital for the traditional neoclassical production function by manufacturing industry subdivision,[a] 1968–69 to 1994–95**

| | | *Industry analysis* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Panel* | *FBT* | *TCF* | *Print -ing etc* | *Petrol -eum etc* | *Basic metals* | *Struct- ural metals* | *Trans- port equip.* | *Other* |
| L | 0.75* | -0.10 | 1.18* | 0.76** | 0.51** | 0.66* | 0.89* | 0.60* | 0.93* |
| | (9.62) | (-0.53) | (3.12) | (2.22) | (2.55) | (2.89) | (6.60) | (2.99) | (5.75) |
| K1 | 0.13 | -0.23 | 0.10 | 0.09 | -0.46 | 0.08 | 0.14 | 0.89*** | -0.01 |
| | (1.13) | (-0.39) | (0.16) | (0.42) | (-1.23) | (0.15) | (0.28) | (1.90) | (-0.04) |
| K2 | -0.22 | -0.03 | 0.67 | -0.53 | 0.74*** | -0.43 | -0.14 | -0.83*** | 0.19 |
| | (-1.56) | (-0.08) | (0.77) | (-1.32) | (1.80) | (-0.81) | (-0.27) | (-1.95) | (0.33) |
| Const. | 0.04* | 0.03** | 0.05*** | 0.05* | 0.04* | 0.06* | 0.03** | -0.01 | 0.03** |
| | (6.57) | (2.06) | (1.72) | (2.59) | (4.27) | (4.07) | (2.51) | (-0.46) | (2.23) |
| No. obs. | 208 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| F. stat[b] | 32.07† | 0.24 | 3.40† | 2.13 | 3.56† | 4.03† | 16.51† | 4.15† | 12.20† |
| Adj. $R^2$ | 0.31 | -0.10 | 0.22 | 0.11 | 0.23 | 0.26 | 0.65 | 0.27 | 0.57 |

a Dependent variable: output growth in constant 1989–90 unassisted prices. All variables are expressed as growth rates.

b F-test of the hypothesis test that all slopes are jointly significantly different from zero. † Denotes significant at the 5 per cent level. Critical values for the panel (F[3,204]) and industry analysis (F[3,22]) are 2.37 and 3.05, respectively

t-statistics in brackets. * Denotes significant at the 1 per cent level. Critical values for the panel and industry analysis are 2.57 and 2.78, respectively. ** Denotes significant at the 5 per cent level. Critical values for the panel and industry analysis are 1.96 and 2.06, respectively. *** Denotes significant at the 10 per cent level. Critical values for the panel and industry analysis are 1.65 and 1.71 respectively.

Counter-intuitive results also apply to both measures of capital. The panel estimates indicate a weak but positive relationship between output growth and growth in machinery and equipment (*K1*) capital capacity. However, initial estimates show a weak negative relationship between output growth and non-dwelling construction (*K2*) capital capacity. At the industry level, growth in machinery and equipment (*K1*), and non-dwelling construction (*K2*) are generally not significant explanators of output growth.

The initial results appear to provide a poor description of industry technology. Nevertheless, the diagnostic tests for intercept and slope homogeneity show that the data are poolable at the 5 per cent level of significance.[12] The large standard errors evident in the initial estimates contribute to this result.

These results could suggest either an inappropriate model or problems with the data series. Because the initial estimates of labour and capital inputs are subject to sampling and non-sampling error, there is not sufficient information available to reject the model. The focus of attention in the current study therefore has been on data inputs.

### 8.5.2 Review of input series

Important analytical judgements are needed to estimate any capital input series (Gretton and Fisher 1997). In this study, marginal revisions are made to test whether those judgements accounted for the poor results. Specifically, there is little information available to differentiate between alternative asset life assumptions. The effect of alternative asset life assumptions on model estimates was therefore examined. The 2-digit machinery and equipment series used in this study assume an average benchmark asset life for the manufacturing sector of 19 years during the 1960s. This is reduced by 5 per cent for each subsequent decade to allow for the effects of accelerating technological change.[13] Shorter asset lives imply a lower value of capital and a lower rate of accumulation (net of depreciation).

Using machinery and equipment stocks with average assets lives shortened by 4 years to correspond to the lower bound of alternative asset age structures (BIE 1985), the basic model was re-estimated. This change had virtually no effect on the estimated labour and capital coefficients.[14] This result indicates that the reason for the mismatch between model and data evidenced in the initial estimation cannot be attributed to inappropriate average asset lives. Other,

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[12] Full test results are available on request (McCalman1998).

[13] The asset life profile is 19 years in 1960s, 18 years in 1970s, 17 years in 1980s and 15 years in 1990s. For a discussion of the issues and details of alternative assumptions about asset lives and retirement functions refer to Gretton and Fisher (1997). This study also analyses the effect of alternative assumptions on the level and rate of growth of fixed assets.

[14] Data and regression results available on request.

more complex factor(s) requiring additional information are more likely to be the source of estimation problems.

To introduce additional information into the estimation process, the annual labour- and capital-input cost shares, derived basic data, were interpreted as a reliable guide to the expected magnitude of the regression coefficients. Using cost share information (Table 8.5), the restricted model was re-estimated using an iterative OLS technique that scaled the underlying input data. The scaling process was repeated until the econometrically estimated coefficients on labour and capital approximated the average cost shares (Table 8.6). (See Appendix 8A for details of the methodology used.)

Table 8.5: **Average labour and capital cost shares by manufacturing industry subdivision,[a] 1968–69 to 1994–95**

| | | *Capital[b]* | | |
|---|---|---|---|---|
| *Industry* | *Labour* | *Machinery and equipment* | *Non-dwelling construction* | *Total* |
| Food beverages and tobacco | 0.59 | 0.28 | 0.14 | 0.41 |
| Textiles, clothing, footwear and leather | 0.69 | 0.20 | 0.11 | 0.31 |
| Printing, publishing and recorded media | 0.77 | 0.15 | 0.08 | 0.23 |
| Petroleum, coal, chemicals etc. | 0.53 | 0.36 | 0.11 | 0.47 |
| Basic metal products | 0.53 | 0.38 | 0.09 | 0.47 |
| Structural and sheet metal products | 0.66 | 0.28 | 0.06 | 0.34 |
| Transport equipment | 0.67 | 0.21 | 0.12 | 0.33 |
| Other manufacturing | 0.68 | 0.25 | 0.07 | 0.32 |
| Total manufacturing | 0.63 | 0.27 | 0.11 | 0.37 |

a Simple average over 1968–69 to 1994–95.
b Refer to Appendix 8A for details of how capital cost shares were apportioned between capital groups.

Table 8.6: **Estimated coefficients on labour and capital using modified data by manufacturing industry subdivision,[a] 1968–69 to 1994–95**

| | | *Industry analysis* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Panel* | *FBT* | *TCF* | *Print -ing etc* | *Petrol -eum etc* | *Basic metals* | *Struct -ural metals* | *Trans- port equip.* | *Other* |
| L | 0.66* | 0.59** | 0.69*** | 0.77** | 0.53* | 0.53** | 0.66* | 0.67* | 0.68* |
| | (9.42) | (5.39) | (2.02) | (2.36) | (2.78) | (2.59) | (5.30) | (3.11) | (4.03) |
| K1 | 0.21* | 0.27 | 0.20 | 0.15 | 0.36 | 0.38** | 0.28 | 0.21 | 0.25 |
| | (4.47) | (2.74) | (1.38) | (1.46) | (1.65) | (2.20) | (1.56) | (1.34) | (1.38) |
| K2 | 0.09* | 0.14*** | 0.11 | 0.08 | 0.11 | 0.09 | 0.06 | 0.12 | 0.07 |
| | (4.30) | (1.77) | (1.31) | (1.37) | (1.30) | (1.42) | (1.53) | (1.39) | (1.39) |
| Const. | 0.03* | 0.02* | 0.02 | 0.03* | 0.03* | 0.03** | 0.02*** | 0.02 | 0.02 |
| | (5.68) | (3.28) | (0.98) | (2.35) | (4.03) | (2.18) | (1.87) | (1.04) | (1.22) |
| No obs | 208 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| F stat.[b] | 40.91† | 31.32† | 2.52† | 3.67† | 4.48† | 4.28† | 11.86† | 4.53† | 5.49† |
| Adj. $R^2$ | 0.36 | 0.78 | 0.15 | 0.24 | 0.29 | 0.28 | 0.56 | 0.29 | 0.35 |

a Dependent variable: Output growth in constant 1989–90 unassisted prices. All variables are expressed as growth rates.

b F-test of the hypothesis test that all slopes are jointly significantly different from zero. † Denotes significant at the 5 per cent level. Critical values for the panel (F[3,204]) and industry analysis (F[3,22]) are 2.37 and 3.05, respectively.

t-statistics in brackets. * Denotes significant at the 1 per cent level. Critical values for the panel and industry analysis are 2.57 and 2.78, respectively. ** Denotes significant at the 5 per cent level. Critical values for the panel and industry analysis are 1.96 and 2.06, respectively. *** Denotes significant at the 10 per cent level. Critical values for the panel and industry analysis are 1.65 and 1.71 respectively.

This procedure provided a new set of labour and capital profiles. A comparison of the new with the original profiles indicates only a minimal difference between the two series (Figure 8.3 shows the differences for manufacturing as a whole). Indeed, much of the difference in the series could be explained by sampling and measurement error. In particular, the differences in growth rates between the original and re-estimated series could reflect variations in labour and capital utilisation and timing problems. Such events are not easily captured in basic data series. For example, the labour series measure hours on the job rather than the intensity of work and capital can be brought on line sooner/later, or retired earlier than assumed in basic calculations. The extent of these problems may vary between projects and across business cycles and cannot be simply resolved by making generalised adjustments to basic data (eg to the general age/efficiency profiles and retirement function for assets). Information about value added cost shares for each industry and the iterative procedure adopted provides one means of allowing for such variations.

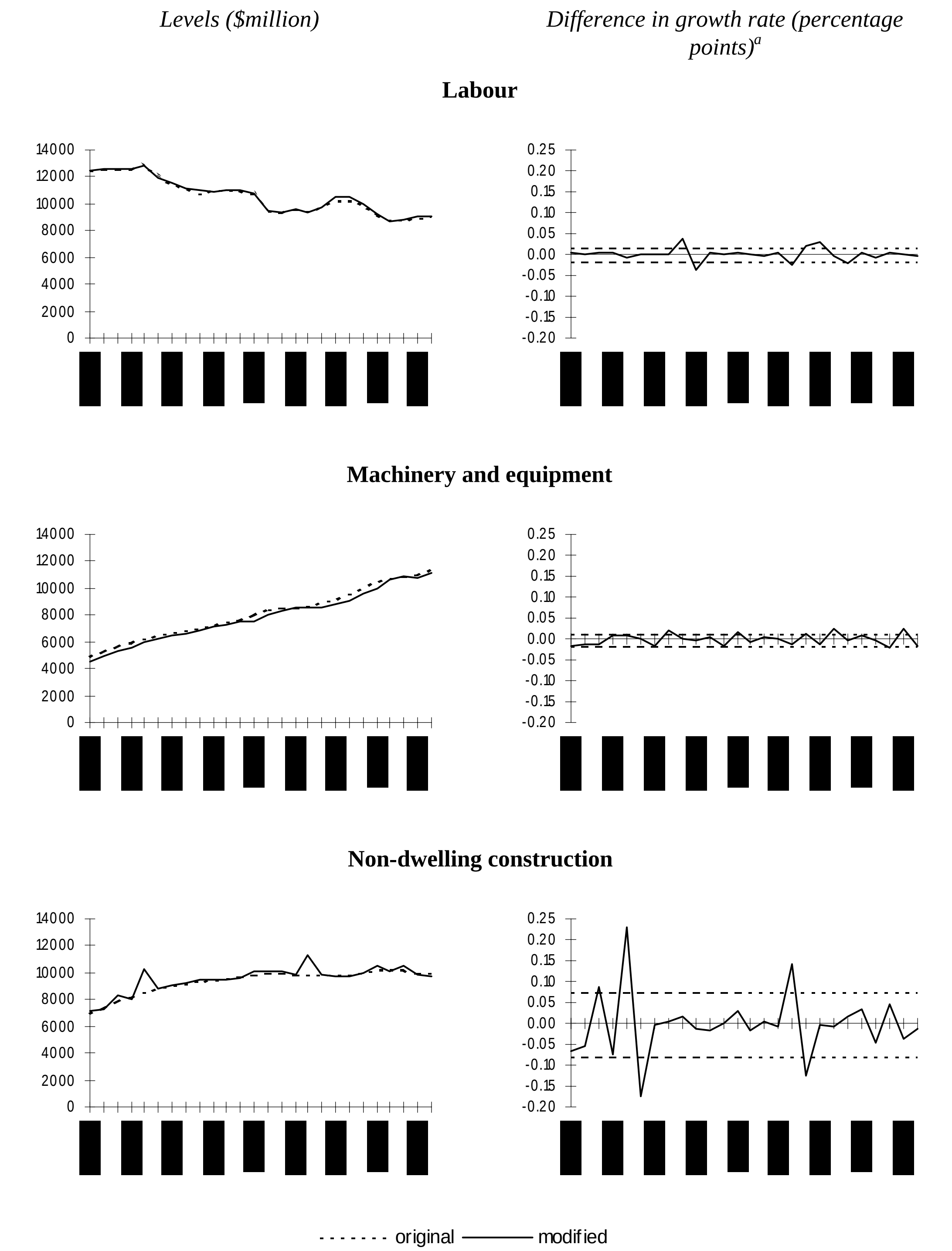
At the manufacturing level, only marginal adjustments are made in the labour and machinery and equipment series, both in the levels and in percentage changes. In addition, there is no drift in either capital stock series suggesting that there is no systematic bias in asset lives used in the basic data calculations. However, the adjustments to the non-dwelling construction stock stand out relative to the, proportionately smaller, adjustments to the labour and equipment series. This difference in behaviour of the series may reflect the lumpy nature of non-dwelling construction items relative to other factor inputs and hence possibly larger variations in the actual intensity of use. For example, 1973–74 and 1985–86 stand out with substantial adjustments to the stocks series. Each of these years followed several years of manufacturing output growth. The timing of these adjustments may be indicative of a more intensive use of existing structures or an accelerated commissioning of new structures in these periods relative other periods (including other economic upswings). It may also indicate the omission of variables that had an exceptional influence on the productivity of labour and capital in these years alone.

### 8.5.3 The extended model

Using the modified labour and capital input data, the extended model incorporating all of the proposed growth theory variables, was estimated by OLS for each industry and pooled OLS for the panel of industry subdivisions. With 208 observations and only 9 explanatory variables there is 198 degrees of freedom for the pooled analysis. While this provides a substantial sample at the sectoral level, the inclusion of the 5 new growth variables reduces the degrees of freedom at the industry level (ie 16 degrees of freedom).

The tests for poolabilitity were repeated for the extended model, but were found to fail at the 5 per cent level. As tests on the truncated model indicated the industry data was poolable, this result is the direct consequence of the introduction of the five growth theory variables. The changed status may be attributed to the loss of degrees of freedom at the industry level. They may also be due to different behavioural characteristics between industries not evident when only value adding factors were included in the production function.

Figure 8.3: **Comparison of original and modified data, total manufacturing, 1969–70 to 1994–95**




a Difference is defined as original less modified series. The horizontal lines show plus and minus one standard deviation from the average difference in the growth rate over the period 1968–69 to 1994–95.

These issues warrant further investigation. Due to the loss of degrees of freedom at the industry level, the panel estimates are emphasised in the discussion of the extended model.

Overall, inclusion of the endogenous growth variables has improved the explanatory power of the model. The adjusted $R^2$ statistic has risen by 10 percentage points, to 47 per cent. The F-tests indicate, for the panel and most industries, that the model estimated is better than the alternative of no model. However, the inclusion of additional growth variables in petroleum, etc actually reduced the explanatory power of the model for that industry.

The panel estimates of the coefficients on labour and capital are of the expected sign and are significant at the 1 per cent level (Table 8.7). Nevertheless, each coefficient is less than the corresponding coefficient in the basic model. An F-test reveals that the sum of the coefficients on labour and capital are significantly different from one at the 5 per cent level. This result indicates that returns to labour and capital recorded in basic data sources embody benefits from human capital and knowledge accumulation. The attribution of returns therefore appears somewhat sensitive to the variables included in the model. Mankiw, Romer and Weil (1992) in an examination of variation in international standards of living, also found that the coefficient on ‘raw’ labour was sensitive to the inclusion of a human capital variable. Further investigation of the sensitivity of the coefficients to the inclusion of new growth variables and the theoretical basis of this variation is warranted.

The major finding from this analysis is that the level of assistance has a negative and significant influence on manufacturing output. This estimate suggests that on average, a one per cent reduction in assistance in any one year leads to a 0.15 per cent permanent increase in output. This result is robust to the underlying input data, with the corresponding estimate using the original data being -0.17 and statistically significant at the 1 per cent level. In addition, the result appears to be robust to the application of alternative estimators.[15]

[15] A variety of restricted and partially restricted models were estimated using the pooled OLS and seemingly unrelated regression (SUR) econometric models. The additional simulation results are available on request.

Table 8.7: **Extended production function using modified data by manufacturing industry subdivision,[a] 1968–69 to 1994–95**

| | | *Industry analysis* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Panel* | *FBT* | *TCF* | *Print -ing etc* | *Petrol-eum etc* | *Basic metals* | *Struct-ural metals* | *Trans-port equip.* | *Other* |
| L | 0.57* | 0.55* | 0.90* | 0.50 | 0.37 | 0.57** | 0.71* | 0.30 | 0.65* |
| | (8.04) | (5.29) | (2.96) | (1.20) | (1.43) | (2.30) | (6.19) | (1.11) | (5.50) |
| K1 | 0.20* | 0.39* | 0.16 | 0.10 | 0.47** | 0.53* | 0.48* | 0.33** | 0.21 |
| | (4.70) | (4.96) | (1.45) | (0.80) | (1.81) | (2.60) | (3.03) | (2.40) | (1.64) |
| K2 | 0.08* | 0.19* | 0.03 | 0.07 | 0.06 | 0.11 | 0.04 | 0.12 | 0.07*** |
| | (3.94) | (2.86) | (0.44) | (1.02) | (0.64) | (1.62) | (1.21) | (1.53) | (1.94) |
| M | -0.02 | -0.01 | -0.06 | 0.04 | -0.30 | -0.09 | -0.09*** | 0.06 | -0.09*** |
| | (-0.91) | (-0.59) | (-0.59) | (0.51) | (-0.45) | (-1.15) | (-1.93) | (0.88) | (-1.99) |
| R | 0.60 | -0.40 | 0.73 | -1.55 | 1.05 | 1.58 | 0.31 | 2.45*** | 0.72 |
| | (1.29) | (-1.59) | (0.41) | (-1.04) | (0.98) | (0.98) | (0.33) | (1.77) | (0.74) |
| $\tau$ | -0.15* | -0.02 | -0.63* | -0.28** | -0.01 | -0.16 | -0.28** | -0.29** | -0.23*** |
| | (-5.16) | (-1.26) | (-4.98) | (-2.15) | (-0.29) | (-1.23) | (-2.73) | (-2.46) | (-1.94) |
| H | 0.77* | -0.08 | -0.38 | 1.60 | 0.92 | 0.21 | 0.58 | 2.06*** | 1.45* |
| | (2.65) | (-0.58) | (-0.30) | (1.49) | (1.33) | (0.22) | (0.95) | (1.73) | (3.09) |
| G | -0.26 | -0.75* | 0.84* | 0.73 | 0.32 | -0.96 | -0.74 | -0.84 | -0.20 |
| | (-1.03) | (-5.20) | (0.77) | (0.91) | (0.53) | (-1.06) | (-1.28) | (-1.03) | (-0.40) |
| Const. | -0.02 | 0.05* | -0.02* | 0.05 | -0.04 | -0.04 | -0.01 | -0.15 | -0.05 |
| | (-0.77) | (3.14) | (-0.19) | (0.55) | (-0.71) | (-0.46) | (-0.22) | (-1.68) | (-0.95) |
| No. obs | 208 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| F stat.[b] | 24.11† | 28.03† | 5.40† | 2.95† | 2.02 | 2.52 | 11.41† | 4.40† | 11.25† |
| Adj. $R^2$ | 0.47 | 0.88 | 0.58 | 0.38 | 0.24 | 0.32 | 0.76 | 0.52 | 0.76 |

a Dependent variable: Output growth in constant 1989—90 unassisted prices. All variables are expressed as growth rates.

b F-test of the hypothesis test that all slopes are jointly significantly different from zero. † Denotes significant at the 5 per cent level. Critical values for the panel (F[8,199]) and industry analysis (F[8,17]) are 1.94 and 2.57, respectively.

t-statistics in brackets. * Denotes significant at the 1 per cent level. Critical values for the panel and industry analysis are 2.57 and 2.78, respectively. ** Denotes significant at the 5 per cent level. Critical values for the panel and industry analysis are 1.96 and 2.06, respectively. *** Denotes significant at the 10 per cent level. Critical values for the panel and industry analysis are 1.65 and 1.71 respectively.

Chand and Vousden (1996) undertook a panel study of Australian manufacturing using data covering the period 1970 to 1991. They found that a 1 per cent increase in an independent measure of assistance (the variable *R* in their study) led to a 0.3 per cent decline in manufacturing industry output.[16] The findings of the two studies lend support to the proposition that, when all factors are taken into account, assistance to Australian manufacturing has lowered manufacturing productivity and growth. That is, the resource allocation effect of assistance to an individual sector appears to have been outweighed by the negative effects of specialisation in slower growing activities.

Incorporation of the additional endogenous growth variables in the model has met with mixed success.

Accumulation of human capital, incorporating a two-year lead relative to industry output growth, is a highly significant explanator of output growth.[17] The estimated elasticity implies a one per cent increase in the stock of human capital would increase output by 0.77 per cent. Although the panel study found a statistically weaker relationship between the stock of R&D and output growth, the results imply that on average, a one per cent increase in the stock of R&D would increase output by 0.60 per cent. The sign and broad magnitude of the estimated coefficients on the human capital and R&D variables are not sensitive to the labour and capital stock series adopted.

The coefficients in the current study, however, appear high relative to the coefficients on value adding inputs and relative to the results in Industry Commission (1995b). That economy-wide study of the determinants of growth also estimated coefficients on human capital (defined on the same basis as the current study, but without the two period lead) to range from 0.04 to 0.07 which is significantly lower (at the 5 per cent level) than the coefficient values obtained in the current study. The coefficients on domestic R&D (also estimated on a comparable basis) ranged from 0.12 to 0.17 and again, are also substantially lower than those obtained in the current study. However, these

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16 It is not possible to directly update that study due to definitional and classification changes in the basic data series and major gaps for some critical data items.

17 The stock of human capital is led by two years on the basis that qualifications and skills are obtained and employed for a specific period (in this case two years) before the benefits are realised. Alternative lead structures were examined for each industry. The two period structure was adopted because it provided results with the highest levels of significance (with the expected sign). A two period lag structure was also found to provide statistically significant results — giving some hint of the possibility of reverse causality. In choosing between the lead and lag structure, it was assumed that the direction of causality is forward from human capital accumulation to growth in output.

estimates are not significantly different (at the 5 per cent level) from the estimates provided by the current study. This leaves open the possibility that differences in R&D coefficients are due to sample variation.

Overall, both sets of estimates lend support to a positive and identifiable link between the accumulation of knowledge through human capital and R&D, and growth.

The attempts to take account of foreign R&D (through the IIT measure *M*) and government infrastructure (through general government capital *G*) have not been successful. Both coefficients have an unexpected sign and are not statistically different from zero at conventional levels of significance.

### 8.5.4 Industry results

Despite the evident need to interpret the industry results with caution due to low degrees of freedom and the poor representation of statistically significant coefficients, some interesting insights can be obtained from these regressions.

Productivity and growth of all manufacturing industries benefits from a reduction in assistance. The estimated coefficients have the expected sign and are statistically significant at the 5 per cent level or above for four out of the eight industries examined (Table 8.7). For another industry, the coefficient is significant at the 10 per cent level. For the remaining three subdivisions the coefficients have the expected sign, although they do not differ from zero at conventional levels of significance. Overall, these results lend strong support to the general sector-wide findings of the panel analysis.

Sectoral estimates indicate also that the responsiveness to assistance changes in any one year is likely to differ between industries. For example, TCF is estimated to receive the largest benefits from a reduction in assistance — a one per cent decrease in assistance is estimated to increase TCF output by 0.63 per cent. This industry has typically attracted above average assistance and for part of the period has gone against the trends in assistance to manufacturing industry (Table 8.1). On the other hand, output in FBT and Petroleum and chemical products appears to be less responsive to assistance changes. FBT has traditionally been afforded assistance at or below average manufacturing levels while Petroleum and chemical products has received assistance close to the manufacturing average. These more detailed results are suggestive that the level of assistance and industry structure play a part in determining the responsiveness of output to assistance changes at the industry level.

Of the remaining endogenous growth variables, accumulation of domestic R&D stocks has a significant and above average influence on output growth for transport equipment. This finding is consistent with the above average concentration of manufacturing R&D spending in the transport equipment industry. For example in 1994–95, transport equipment undertook 18 per cent of manufacturing R&D, while its contribution to manufacturing output was approximately 11 per cent (ABS 1996).

In addition, human capital accumulation is estimated to have a significant influence on the output of several industries. The coefficient on human capital is significant at the 1 per cent level for other manufacturing, which includes some 'high'-technology industries such as electronic and electrical equipment and appliances. The coefficient on human capital is significant at the 10 per cent level for transport equipment. As with the sector-wide analysis, however, the estimated coefficients on human capital and R&D growth appear disproportionate to the estimates on the value adding factors.

Attempts to account for the effect of foreign R&D and government infrastructure did not produce statistically significant coefficients at the industry level that have any economic interpretation.

## 8.6 Conclusion

This study has used Australian 2-digit ANZSIC manufacturing industry data, over the period 1968–69 to 1994–95, to test the effects of trade liberalisation on output growth.

The empirical results for this period indicate strong support for the proposition that trade liberalisation raises output growth in any one year. This result is robust across industries and is invariant to the econometric method chosen. It is also consistent with the findings of other studies.

The results also lend support to the role of R&D and human capital in determining growth. However, the current analysis does not provide an empirical link between foreign R&D and government infrastructure and output. Despite the weaker findings for these growth theory variables, the role of trade liberalisation stands out as being positively and significantly linked to manufacturing industry growth, over the last three decades.

The analysis in this paper draws on recent developments in endogenous growth theories to posit a causal relationship between trade protection and growth. The empirical analysis provides support for such a link. To further develop our understanding of this link, it would be necessary to also explore the interaction between trade protection and other endogenous growth variables, and the mechanisms of how these variables interact over the longer run. The new empirical information provided by this study provides an important step in this developmental process.

## Appendix 8A: Data sources and methods

***Output*** (*Y*) is measured as the value of gross product at factor cost, in constant 1989–90 unassisted prices. To obtain estimates of output at unassisted prices, output at domestic transaction prices are revalued using the Commission's estimates of the effective rate of assistance for each 2-digit industry. Estimates were taken from Gretton and Fisher (1997).

***Labour inputs*** (*L*) are measured as the total number of hours worked in a year by persons employed for each 2-digit industry. The original hours worked data were provided on special request by the ABS. Full details of methods used to construct an annual series are given in Appendix B of Gretton and Fisher (1997).

***Capital capacity*** (*K*) is measured as the stock of physical capital available for use in production, in a particular year. It was estimated using a generalised perpetual inventory method (PIM). For the purpose of this study, capital capacity has been divided into two commodity groups: machinery and equipment, and non-dwelling construction. Full details of the estimation method and assumptions are outlined in Chapter 5 and Appendix C of Gretton and Fisher (1997).

Box 8A.1 (of this Appendix) outlines how the ***modified labour and capital*** data series were developed.

***Domestic R&D*** (*R*) is measured as the value of the stock of R&D capital available for use in production, in a particular year. The aggregate stock of public and private R&D was estimated using the PIM, assuming a constant depreciation rate of 10 per cent. R&D expenditure data from 1985–86 to 1994–95 were provided by the ABS on special request, and data back to 1976–77 were taken from various editions of ABS Cat. No. 8112.0.

An initial stock was obtained by assuming that in steady state growth, the rate of accumulation of R&D is equal to the rate of growth of R&D expenditures:

$$\dot{R} = \dot{E} \qquad \text{(A1.1)}$$

where $\dot{R}$ and $\dot{E}$ is the proportional growth in R&D stocks and R&D expenditure, respectively. Noting that the growth in R&D stock, in any one period, can also be represented by:

$$\dot{R}_t = \frac{E_t}{R_t} - \delta \qquad \text{(A1.2)}$$

where $E_t$ is expenditure and $R_t$ is the stock of R&D in any period t, and $\delta$ is the annual rate of depreciation. Using the A1.1 and A1.2 identities, the R&D capital stock (at time $t$) can be defined as:

$$R_t = \frac{E_t}{\bar{E}_t + \delta} \qquad \text{(A1.3)}$$

The initial benchmark stock value was calculated using equation (A1.3) and evaluating at $t$=1976–77. The annual average depreciation rate was assumed to be 10 per cent. From this starting stock value the remaining R&D capital stock series was calculated.[18] The series was projected back to 1968–69 using an average growth rate in the capital stock of domestic R&D, for the period 1976–77 to 1979–80.

To capture the extent of ***trade in intermediate capital goods*** ($M$), the Grubel-Lloyd intra-industry trade (IIT) index for other machinery and equipment, and transport equipment was used. The IIT index measures the simultaneous export and import of goods produced within the same industry. The index values for the period 1968–69 to 1992–93 were taken from Industry Commission (1995c) and extended to 1994–95 using more recent foreign trade data.

***Public capital*** ($G$) is measured as general government stock of net public capital for non-dwelling construction and equipment, in constant 1989–90 prices (ABS Cat. No. 5521.0). It includes government owned office buildings, factories, vehicles, office equipment and other industrial machinery. However, this measure of public capital excludes government owned houses and flats and privately operated toll roads.

***The level of protection*** ($\tau$) afforded to each industry was measured using the nominal rate of assistance (NRA) on output. The NRA includes tariffs and import quotas but does not include benefits (penalties) from assistance on intermediate inputs or benefits from production subsidies, tax concession etc.

***The stock of human capital*** ($H$) is proxied by using the proportion of the labour force with post-school qualifications. The number of persons with post-school qualifications for the years 984 to 1995 was provided by ABS on special request. Data back to 1979 were taken from ABS Cat. Nos. 6235.0 and 6227.0 (various issues). The series was projected back from 1979 to 1968 using a linear relationship between the number of people with post-school qualifications and GDP, estimated over the period 1980 to 1994.

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18 Industry Commission 1995b, Appendix QA, p. 23–24 provides a comprehensive outline of the method of calculating R&D stock using the PIM.

To apportion the ***capital cost share*** between machinery and equipment and non-dwelling construction the following steps were taken. The rental price per unit of capital was multiplied by the net capital stock to obtain an approximate return to fixed capital, for each type of capital and for capital in total. The corresponding proportional return was then calculated for each type of capital. This represented the proportion of the capital cost share attributable to that type of capital.

## Box 8A.1: **The iterative ordinary least squares (OLS) procedure**

The aim of the iterative OLS procedure is to develop labour and capital data series that produce OLS estimated coefficients equal to labour and capital cost shares calculated from basic data sources.

The steps to develop a set of modified labour and capital profiles were:

**Step 1**

Starting values for the modified series are set equal to the original labour and capital series. Using these starting values and OLS, the neoclassical production function (equation 8.2) is estimated.

**Step 2**

Set up the following constrained optimisation problem:

Objective: *minimise* $\left|\beta_i - C_i\right|$

where $\beta_i$ is the OLS coefficient on factor input *i;*

$C_i$ is factor *i's* cost share calculated from basic data; and

*i's* are labour (*L*), machinery and equipment ($K_1$), and non-dwelling construction ($K_2$), respectively.

Constraint: 't-statistic' for each $\beta_i \geq 1.30$ (ie. significant at 20 per cent level).

**Step 3**

The above constrained optimisation problem for labour is solved by allowing a scaling factor on labour, for each observation, to vary until the constraint and optimality condition are satisfied. Machinery and equipment, and non-dwelling construction data series remain fixed.

**Step 4**

Step 3 is repeated for machinery and equipment ($K_1$), with non-dwelling construction ($K_2$) and modified labour data series fixed.

**Step 5**

Step 3 is repeated for non-dwelling construction ($K_2$), with modified labour (step 3) and machinery and equipment (step 4) data series fixed.

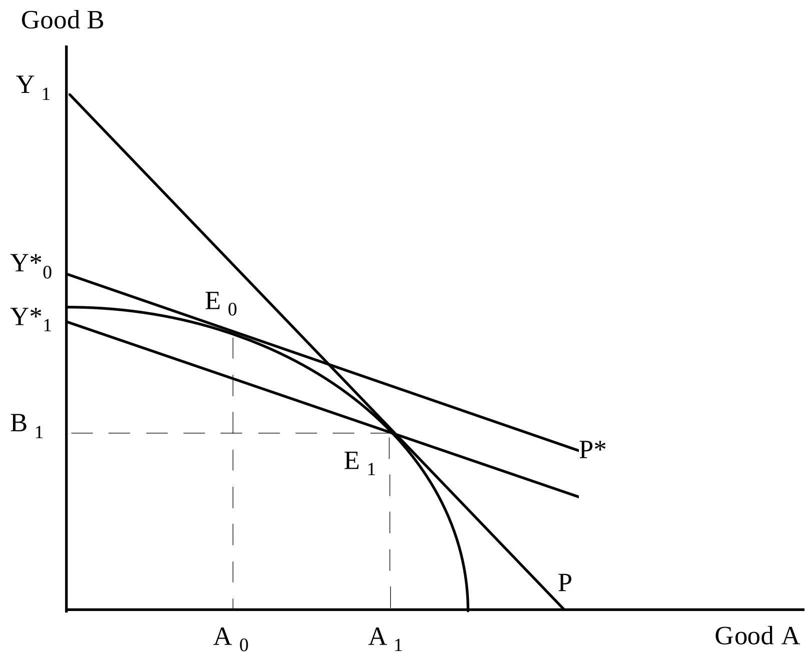
**Step 6**

Steps 3–5 are repeated until all optimality conditions and constraints hold simultaneously.

## Appendix 8B: Output at unassisted prices

'Real' measures of output are in fact measured in units of exchange. Care must therefore be taken in interpreting the results of productivity studies when the price ratios used for revaluation are influenced by changes in government policies (Chand 1997). This is shown in the following figure where the curve passing through $E_0$ and $E_1$ shows all combinations of two different goods — *A* and *B* — that can be produced domestically with available resources.

Figure 8.B1: **Output valued at assisted and unassisted prices**




Source: Chand (1997)

In the absence of government policies, with the relative prices of the two goods given by the line *P**, producers would choose the combination $E_0$. However, a tariff (for example) on good *A* would move domestic relative prices from *P** to *P*. Producers would then choose combination $E_1$. Using the domestic price ratio *P* to measure constant price output, national output measured in terms of good *B* would rise from $Y^*_0$ to $Y_1$. But at the unchanged international price ratio P*, national output would fall from $Y^*_0$ to $Y^*_1$.

Using this illustration it can be seen that if there were productivity improvements that moved the production possibilities curve outwards, the measurement of the increase in the output of good *A* in terms of good *B* could be 'understated' if it were measured in domestic relative prices over a period in which the tariff on good *A* was reduced. In this case, the move in the domestic price line back from *P* to *P** would tend to offset the effect of the outward movement in the production possibilities frontier. Conversely, productivity improvements could be 'overstated' if measured using domestic prices over periods in which tariffs were increasing.

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## **Discussant** — *Neil Vousden*

I congratulate the authors on their paper which is an ambitious attempt to analyse the link between trade and growth at the sectoral level. Tests of endogenous growth theory have been few and they tend to have been at a high level of aggregation and have not always considered the role of trade. This study has a particular edge in that it uses updated capital stocks covering the important period of liberalisation from the late eighties through to the mid-nineties.

My concern in these comments is to identify what the paper actually explains and where it falls short of its stated aim of measuring the effect of trade liberalisation on productivity growth. I will also attempt to offer some suggestions on how the authors might improve the explanatory power of their tests.

Economists have long been perplexed by the apparently simple question, 'What are the effects of trade on economic growth?' I am reminded of the difficulty faced by the medical profession in explaining the effects of a long-standing drug, aspirin, on various medical conditions: their empirical research keeps showing a significant effect, but they do not know what is causing it. They do not understand the mechanism. Similarly, there is a large empirical literature showing a positive effect of trade on growth, but economists are still unsure how this effect works. It is therefore incumbent on all empirical research in this area to tell us something about what the mechanism is. By what route does trade influence growth?

A great deal has been written in popular articles about the dynamic effects of trade, but it is fair to say that we do not understand these effects very well at all. Our lack of understanding has been exacerbated by some common confusion about what constitutes a dynamic effect of trade. For example, so-called X-efficiency effects in which firms' cost curves are shifted by a change, are often termed dynamic effects when they are really static (or level) effects. True dynamic effects of trade are the sort of things identified in the 'new' endogenous growth theory in which trade policy can change the long-run growth rate, and in the traditional neoclassical growth model, where trade changes the long-run steady-state level of output and so affects the dynamic adjustment path. There is no presumption on which of these effects is important (if any) and it is incumbent on empirical work to distinguish between them. Papers such as the present one can make a real contribution in this respect.

As an aside, I should also note that even where it is possible to empirically identify one of the above effects, it is very difficult to attribute any unambiguous welfare cost or benefit to it. In addition, it is most likely that the welfare effects associated with X-efficiency changes and changes of steady state in the neoclassical growth model are already captured in existing measures of the costs of protection. Thus, even if the empirical work shows a strong effect of trade on growth or on something called X-efficiency, we should treat the result with caution because its welfare implications are unclear and may be quite small. A paper such as the present one is clearly not in a position to address such issues. However, it is important to bear this caution in mind when interpreting the results: policy-induced higher growth is not *necessarily* beneficial when the intertemporal costs and benefits of the policy are weighed up.

What does the present paper tell us about the dynamic effects of trade? These include its effects on research and development, on investment in human capital formation, on learning by doing and on the international dissemination of knowledge, which in this paper is picked up by an intra-industry trade variable. We may also be interested in using the model to test for static 'X-efficiency'-type effects.

How effectively does the model identify these various effects? Surprisingly, in its present form, it does not capture the dynamic effects of trade at all because the regression equation (8.8) relates the change in output to the change in the protection level, thus picking up the effect of the tariff level on the level of output. It is not capturing the effects of the tariff level on the *rate of change* of output. Thus, the model is capturing level effects of the X-efficiency type — changes in the way in which labour is utilised, changes in management, and work effort, etc. It is right that the model test for level effects, but it should be clear that they are not dynamic/growth effects.

The simplest way of capturing the latter would be a minor re-specification of the model to include either $\tau$ or log $\tau$ on the right-hand side of equation (8.8). However, this would still leave a couple of problems unresolved To see why, note that the right-hand side of the regression equation (8.8) includes an R&D variable and a human capital variable. If the dynamic effects identified in the endogenous growth literature are present, there is a good chance that the tariff level is influencing the rate of growth of output through one of these variables. That would suggest some correlation between the tariff level $\tau$ and R&D and/or human capital (possibly also physical capital). The authors do not appear to have included a correlation table, so I cannot check. However, if there is correlation, then we might have cause for concern on econometrics grounds. If there is not correlation, then the tariff is not influencing the growth rate through the human capital stock or the level of R&D. It is then not clear from the model what the channel of influence is. I suggest that in further work the authors should address this important question: by what mechanism is the tariff influencing the growth rate, and what is the most appropriate model specification to identify that mechanism?

Incidentally, I notice that the human capital and R&D variables are not significant at the 10 per cent level in most cases. However, other studies suggest that they are important. My guess is that this result is due to problems with the database and that when these are resolved, more significant results will be obtained for these variables.

There is another point to be made about the role of R&D. In many endogenous growth models with R&D (eg Grossman and Helpman 1991) trade liberalisation increases growth only when it is *bilateral* because selling to a bigger foreign market increases scale thus increasing the marginal returns to R&D and innovation. As a result, more innovation and R&D occur, pushing up the economy's growth rate. However, to pick up such an effect in a regression, it would probably be necessary to include foreign tariffs as a right-hand side variable (domestic tariffs would suffice if domestic and foreign tariffs are correlated).

As a final point, it is worth noting that this model does not seem to provide good support for endogenous growth models of the type based on human capital accumulation and R&D. Nor does it provide strong support for the Mankiw, Romer and Weil augmented neoclassical model in which human capital accumulation is a significant source of growth. It would be interesting for the authors to devote some space to discussing the implications of their work for growth theory. At present, economists simply do not know which growth model or paradigm is the correct one. To date, empirical tests have been limited. Empirical work by Backus, Kehoe and Kehoe (1992) and by Charles Jones (1995), suggest that support for the class of models based on spillovers and scale effects is very weak, but there is the need for more empirical studies, particularly at the sectoral level. Thus, the present paper has an important contribution to make to our knowledge of the determinants of growth. It is potentially all the more valuable because it uses sectoral panel data.

The present paper is an excellent piece of work as it stands. However, I am also excited by what it promises and I strongly urge the authors to continue working with this data set and to explore the issues I have raised.

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## **Discussant —** *Ron Bewley*

Chand, McCalman and Gretton (CMG) analyse the effect of changes in the level of protection on output of eight manufacturing industries. As an academic piece of research, this paper represents an interesting investigation of the problem and concludes that the falling trend in protection over the last 27 years have been accompanied by increased growth in industry output adjusted for the level of the assistance. If, however, this research, like any other, is used to draw actual policy conclusions, additional econometric analysis is necessary.

All econometric results are fragile in the Leamer (1983) sense to a lesser or greater extent. That is, different numerical outcomes are always possible by reasonable alternative specifications, data, or sample periods. Thus, fragility in itself is not an issue. The real question for policy analysis is, 'What does it take to overturn the conclusion(s)?' It is only by judging the applicability of any alternative methods that can overturn *conclusions* one can confidently form a balanced view about the impact of economic policy. No conclusions should be drawn when seemingly innocuous or reasonable alternatives imply different conclusions.

There are eight important steps in this re-analysis of a problem: replication of the actual results; the setting up and interpretation of the 'problem'; the suitability of the data for the problem; the specification of the model; the choice of estimator; the choice of restrictions placed on the model; and validation and diagnostic testing of the estimated model. I propose to go through each of these using the data kindly supplied by CMG.

Replication of the results, not always a straightforward task,[19] was simple thanks to the careful annotation of the data set and the supply of the LIMDEP code by CMG. The nature of the problem is also well stated but, given my experience as a lobbyist with Austrade on the performance of the Export Market Development Scheme and other organisations, I fear that a paper such as this might easily be misinterpreted without a disclaimer. Since the sample period commences well after the start of the introduction of the assistance programs, this paper can say nothing about whether new assistance, the infant industry argument, is good or bad. It neither can say anything about what would happen if assistance were completely removed. For example, compliance of firms with the conditions of the assistance may generate new activity that is socially desirable. Once this assistance is removed, the incentive to achieve the socially desired outcomes is also removed and firms may again under-perform. What this paper does is what the title says; it looks at the effects of trade liberalisation.

[19] See, for example, Dewald *et al*. (1986).

It was difficult to tell whether or not the data are suitable for the problem because of my lack of familiarity with the problem, the level of detail in the appendix, and the adjustments to published data made by CMG. As it stands, CMG have constructed all of the key data in the spirit of tackling this important issue so I will accept it as appropriate, but hope that revisions will contain more detail.

With regard to the model, the choice of levels or differences (growth rates) could be crucial. The use of differences means that only short-run effects are being analysed when it is of at least as much importance to look for the existence of a long-run relationship between the variables. Moreover, the use of differences is derived from a first-order approximation and, while valid as a mathematical representation, does beg the question here as to what role assistance is playing. By having the assistance variable enter additively, it is as though labour and capital produce a certain output and then assistance swallows up some of it. If, however, the coefficients on labour and capital depended upon the assistance variable, the estimated model could be interpreted as assistance affecting the efficiency of use of these factors of production.

While such technical issues as the choice of estimator may seem unnecessary in an 'economic debate', major differences can ensue from a simple reformulation of a problem. Because a panel data approach was used with the same coefficients applying to each industry, the finding of no significant fixed effects reduces the estimation problem to one of using OLS on the eight equations stacked as one; this produces unbiased coefficient estimates but biased standard errors if stochastic effects are present.[20] I re-estimated the model as an eight-equation seemingly unrelated regression (SUR) with across equation restrictions but fixed effects and iterated to convergence producing maximum likelihood estimates. The assistance coefficient of -0.15 with a t-ratio of 5.16 reported in CMG reduces in its impact to -0.06 with a t-ratio of 6.17. Thus under the revised setup, the estimated effect is much reduced but the apparent significance has increased. Importantly, the policy conclusions remain the same and validates CMGs line of research.

In terms of restrictions, one interesting generalisation of the basic CMG model is to allow the coefficient on assistance (only) to vary across industries — a relaxation which is easy to implement in the SUR context (other generalisations are adopted in the paper). The results of this generalisation are reported in Table 8.D1 from where it can be seen that differences between industries do emerge. In particular, assistance has no apparent impact on the FBT industry and has been positive in the printing industry. Thus, while CMGs 'average' industry effect holds, a less

20 This estimator was used in the version presented at the conference. Subsequently, an SUR approach was also followed. However, there are differences between my results and CMGs which we could not rationalise. They could be due to different numerical procedures, or estimators. See Bewley (1986) for a discussion and comparison of this and other estimators considered here.

restrictive model reveals that the policy conclusions may best be applied selectively. However, it should also be stressed that CMGs new estimates are not the same as those presented here and further work is warranted to rationalise the differences.

### Table 8.D1: **Estimated industry-specific effects of trade liberalisation**

| *Industry* | *Coefficient* | *t-ratio* |
|---|---|---|
| Food, beverages and tobacco | -0.02 | -1.71 |
| Textiles, clothing, footwear and leather goods | -0.58 | -7.57 |
| Printing, publishing and recorded media | 0.12 | 1.95 |
| Petroleum, coal and chemicals | -0.08 | -4.12 |
| Basic metals products | -0.15 | -1.74 |
| Structural metals products | -0.20 | -3.87 |
| Transport equipment | -0.42 | -6.74 |
| Other | -0.14 | -1.94 |

While some econometricians believe in applying a barrage of diagnostic tests to validate a model, I believe a far more useful approach is to selectively challenge a model in directions which are important to the conclusions. Thus, in this case, it is of great importance to test the stability of the assistance effects over time using recursive coefficient traces or similar representations of the data. My initial experimentation was reasonably positive on this front.

Given that there has been a strong downward trend in the levels of assistance, it is useful to distinguish this effect from a simple time trend. By augmenting the CMG model with a trend it was possible to show that they are not simply capturing some general secular effect. This analysis can be taken a step further by splitting the sample into the first half, when assistance to TCF was increasing, and that when it was decreasing.

Finally, preliminary experimentation suggested that it might be possible to construct a model in levels using cointegration analysis. This would effectively remove the endogeneity problem that might exist between output, labour and capital and introduce some more interesting dynamics through the incorporation of equilibrium correction terms in the growth variable model.

This paper should generate some interesting debate on the issue of trade liberalisation effects on industry. The general conclusions are quite strong and stand up to alternative modelling strategies. However, a richer model might better describe this data set and I would like to encourage CMG to explore some of the avenues brought up in this discussion.

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## General discussion

The discussion focussed on the following themes:

- sectoral differences;
- functional form and interaction terms;
- the use of cost shares and the construction of data series;
- the economic environment of the analysis; and
- the use of unassisted prices rather than domestic prices.

### Sectoral differences

One participant noted that scale economies, while potentially important in manufacturing, were also important to growth in other sectors. In particular, scale economies were evident in sectors that are intensive users of information technology (such as banking and communications). It was also recognised that while there is evidence of scale economies in manufacturing industries, there are many service industries that tend not to exhibit significant economies of scale. Overall, the differences between the sectors serve to complicate comparisons between microeconomic and macroeconomic studies of productivity growth. The relative growth of service industry activities has further complicated the reconciliation of macro and micro trends in productivity growth.

### Functional form and interaction terms

Some participants suggested the adoption of a more flexible functional form for the production function would have allowed for interaction between various inputs, such as research and development expenditure and human capital. Two studies by Catherine Morrison were identified as investigating such interaction effects.[21] The principle underlying the suggestion was recognised as important. Paulene McCalman advised that an attempt had been made to incorporate interaction terms, but that it was unsuccessful. She agreed that investigating a different functional form for the production function was an important area for future research and should be pursued.

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21 Morrison C.J. and Siegal D. (1997) 'External Factors and Increasing Returns in Manufacturing', *Review of Economics and Statisitcs*, **79**(4), pp. 647–654; and Morrison C.J. and Siegal D. 1998, *Estimation of Scale Economies Underlying Growth and Productivity: The Empirical Implications of Data Aggregation*, mimeo, University of California (Davis) and University of Arizona (West).

### The use of cost shares and the construction of data series

The novel use of cost shares to construct modified data indices for the labour and capital inputs attracted comment. It was recognised that the procedure adopted meant that data assumptions used in estimating cost shares also influenced estimates of output elasticities with respect to capital and labour.

### Economic environment

It was noted that the analysis involved an examination of the effects of assistance on productivity and constant price output, holding labour, capital and other factors fixed. It would also be useful to relax these assumptions and to extend the analysis to examine the effects of assistance on other industry variables, including employment.

### The use of unassisted prices

There was some discussion about the appropriateness of deflating the current value of domestic output, which is based on assisted domestic prices, to its shadow value based on unassisted prices. The general concern was that the method of deflation might itself generate some of the correlation that is reported between changes in output and changes in tariff assistance. In reply, Satish Chand noted that statistical testing had shown that there was a low level of correlation between explanatory variables. This was interpreted to indicate that the relationships identified had economic meaning and were not statistical artefacts of the underlying data compilation methods.

# 9 ECONOMIC POLICY ISSUES OF REFORM IN THE UTILITIES AND SERVICES INDUSTRIES

*Peter Forsyth*

## 9.1 Introduction

Over the past ten years, the ways in which the utilities and transport services industries have been organised have been transformed. The typical form of organisation was one of public sector monopoly, with some examples of limited competition and private sector involvement, but on a highly regulated basis. It is not possible to identify a specific point of time when reform 'began', and the earlier reforms tended to be ad hoc, such as management changes in public enterprises, and pressures on them to lessen deficits or increase profits. This led to more structurally based reforms; there has been substantial corporatisation and privatisation, markets have been opened up through the removal of imposed barriers to entry. Competition has been fostered in those parts of hitherto monopoly industries where it is feasible, and where it is not, price regulation designed to be consistent with good incentives has been implemented (for a compendium of reforms, see Industry Commission 1998). Much regulation which remains is intended to promote rather than hinder competition, or, at least, limit the use of market power. With a few exceptions, the principles adopted have been those advocated by economists.

The economic policy issues which remain are of two types. The first type are those of implementation. There is no longer much debate as to whether particular industries should be opened up to competition, or that enterprises should be corporatised or privatised. The issues are now ones of how to make chosen reforms work effectively. For example, there is a widespread attempt to promote competition in parts of industries which still have elements of natural monopoly; this leads to the problem of determining prices and conditions for access to essential facilities which remain monopolies.

The second type of issue is a broad one, which cuts across industries and different types of reform. Reform has been going along for long enough for its success to be evaluated. Certainly there are gains; for example, there has been significant productivity growth in some industries. In the Electricity, gas and water, and the Transport, storage and communications sectors, both significantly affected by reform, multifactor productivity growth since 1984–85 has been higher than for other sectors (Industry Commission 1997, p. 48). Other reforms, which do not necessarily show up as productivity gains, such as moves to more efficient pricing, are having an effect. This said, the gains in some areas, such as aviation, have been modest, and smaller than anticipated. Also, some of the large gains in productivity, such as in electricity, preceded major structural reforms (Forsyth 1992). This indicates that these structural reforms were not essential for productivity growth, though they may be needed to ensure that the gains are not frittered away when governments turn their attention away from these industries.

This raises a set of broad questions about reform. Overall, how successful has reform been in meeting the expectations held for it? Where performance has fallen short of expectations, why has this been so? Are there further changes needed to complete the reform process?

Some answers to these questions are suggested here. In particular, it is suggested that to understand how well reform works, it is necessary to examine not only product market aspects but also labour market aspects, and the interactions between them. Typically, analysis of reform of the utility and service industries has focussed almost entirely on the product market side. Discussion of labour markets tends not to take much account of product market issues. However, the interactions between the two markets are critical — aspects of both combine to determine outcomes. It is labour market features which explain why airline deregulation proceeded very differently in Australia from the United States, and the relatively modest performance in the industry possibly has more to do with the labour market than remaining elements of natural monopoly.

These broader questions are explored in the latter part of the paper. However, to begin with, the issues that have been arising with the implementation of reform are examined.

## 9.2 Implementing reform in utilities and services

There is a well established suite of reforms which can be applied to utility and transport services industries to improve their performances. These reforms have been implemented in a range of countries, such as the United States, the United Kingdom and New Zealand; the emphasis on individual reforms differs. In Australia, there has been extensive use of all the types of reforms considered here. Some types of reform are notable for their absence; while there has been corporatisation of a rather vague kind, there has been little attempt to implement incentive mechanisms within public enterprises.

One kind of reform centres around ownership and management; there has been extensive corporatisation and privatisation in Australia. Public enterprises are considered to have weak incentives to achieve productive efficiency, and corporatisation is expected to strengthen these incentives. Transfers to private ownership are likely to give fullest scope for incentives to reduce costs.

Another reform is that of deregulation, or opening markets up to competition. There were legal prohibitions on entry into several industries, such as domestic aviation, telecommunications, electricity generation and buses. Deregulation was begun early in the reform process, though it has been slow in cases such as telecommunications.

Competitive tendering has been a significant reform for those services which are not likely to be provided in competitive markets. Thus, governments contract out some services, such as cleaning or information technology. Sometimes competitive tendering is used as an alternative to privatisation and deregulation, such as when a government contracts out the operation of urban bus services, but does not privatise or deregulate them. The product market remains a monopoly, under control of the government, which may tailor services to meet non-economic objectives, such as the delivery of community service obligations.

Two types of reform, which are essentially new to Australia, concern access pricing and monopoly regulation. There is an attempt to open markets in the utilities and transport services as far as is possible. Previously, if there was some natural monopoly in part of the production chain, for example in electricity transmission, the whole electricity industry would be monopolised. If parts of the industry, such as generation, are to be opened up to competition, it is necessary to ensure that the new competitors have access to the remaining natural monopoly facilities, which are essential for them to deliver their product to the market. These facilities are often owned by one of the competitors. Hence, if competition is to be promoted, there will need to be regulation of prices and conditions of access. Part IIIA of the Trade Practices Act, along with other industry specific legislation, seeks to regulate access.

Once monopolies have been corporatised or privatised, and are seeking profit more aggressively, they will have a strong incentive to use their market power to increase prices. Thus, the issue arises of how best to regulate prices.

Each of these reforms poses some problems, mostly those of implementation. These can be considered in turn.

### 9.2.1 Privatisation

Privatisation has remained controversial, though governments in Australia have mostly accepted it. Perhaps the main reason for their willingness to privatise lies in the revenue implications — sales of large enterprises yields revenues which give governments, especially state governments, a good deal of financial discretion. Thus, the privatisation of electricity in NSW is largely being advocated in public debate on the grounds that it will free up government funds for other purposes. This is not an especially valid ground from an economic viewpoint, and there may be an argument against privatisation to the extent that governments use the resultant funds unwisely.

One issue surrounding privatisation concerns how extensive it should be. Governments are now privatising infrastructure projects, such as airports, and encouraging private funding of roads, tunnels and rail track. These do not have significant operating costs, and the productivity gains possible are limited. Further, there is some concern that governments are subsidising the private sector to fund poor projects which they cannot afford to fund themselves (Mills 1991, Trace 1997). Privatisation of such assets may not achieve much by way of productivity increases, but it poses considerable problems for pricing policies and restraint of competition (Mills 1997).

Another issue which has been debated has been that of the cost of capital to the government (Quiggin 1997, Hathaway 1997a, 1997b). It has been maintained that, even after allowing for risk differences, governments are able to obtain cheaper finance than private firms; to the extent that this is so, there is an argument that privatisation creates a welfare loss. This issue remains a live one, and the exact nature of the alleged distortion has yet to be identified, and its full welfare implications have yet to be analysed.

The links between privatisation and disincentives for market liberalisation have long been recognised, and examples of conflicts of interest keep reappearing. The federal government has recently sold Qantas for a good price which reflects the high profits it earns from tightly regulated routes, such as that to Japan. Currently, the Industry Commission is examining international aviation negotiations and open skies is a policy it could recommend. Can the government legitimately wipe off a significant part of the value of Qantas by liberalising soon after it has sold it to its new owners? These sorts of issues keep turning up when regulated firms are privatised. Related to this is the issue of what price the government should sell regulated enterprises for, and how much use of market power they should be allowed to make. Just before it sold the major airports, it increased the prices they were allowed to charge, thus increasing their market price substantially.

Even though there are many examples of privatisation now, there has been little by way of assessment of its success. It is not clear what it has contributed to productive efficiency, nor has there been much evaluation of how well governments have implemented privatisation, taking into account the use of proceeds and competition aspects.

### 9.2.2 Competition policy

Competition policy has been less controversial than privatisation, and there has been less debate about opening markets up to more competition. However, here too there has been little by way of evaluation of the results. In some cases, it appears that deregulated markets are not as competitive as had been hoped; the domestic airline market, which has remained a duopoly, is a case in point (for an early assessment of gains, see Bureau of Transport and Communications Economics 1993). Barriers to entry are more prevalent than expected, and elements of natural monopoly still exist. This provokes the question of whether these markets are sufficiently competitive to ensure that efficiency is maximised. It is also arguable that new entry, not just large numbers of firms, is needed to have a significant impact on efficiency.

### 9.2.3 Competitive tendering

Competitive tendering poses issues which are still being debated. The most critical question concerns that of how large the efficiency gains from contracting out are. The cost savings can be large, but if these are achieved through worse working conditions and more effort on the part of workers the cost savings will be an overestimate of the efficiency gains (Quiggin 1996, Chapter 13). In some cases, contracting out could lead to reduced efficiency in spite of cost savings. Contracting out is an area which is being subjected to extensive evaluation, and some light can be expected to be shown on this question. A more difficult issue is that of the extent to which contracting out is worthwhile; it may be easy to measure cost savings, but it is more difficult to measure the various intangible benefits from having a task done in-house. The Industry Commission is probably quite right in not contracting out all of its research.

### 9.2.4 Access to essential facilities

Access regulation is essentially a new area, and it is to be expected that there will be complex questions to be answered (for a review, see King and Maddock 1996). The nature of the key question is quite straightforward; it is one of determining the access price which maximises efficiency. A low access price will make it cheap for new competitors to supply, and competition in the potentially competitive segment of the industry will be enhanced, resulting in low prices for the final output. But the access price could also be too low, as would be the case if it were set below marginal cost, and the new entrants had an excessive competitive advantage over the incumbent. Another problem with a low access price is that it may not be sufficient to cover the costs of investment by the incumbent in the facility and in the long run, it will cease to invest (Industry Commission 1995).

One option is to leave access price determination to negotiation between the parties. If this is done, the incumbent monopolist will ensure that it does not lose out through new competitors forcing down the prices of the final outputs; if the object of opening up access is to promote competition, this option will fail. However, the incumbent, as always, has an incentive to allow access on its own terms — when the new firms are more efficient producers in the competitive part of the industry, it can turn their cost savings into its own profits. Negotiation is consistent with productive efficiency, though it does not promote allocative efficiency through the reduction of market power. New Zealand has experimented with not having *formal* access price regulation in telecommunications; however there has been much litigation, and informal regulation through political intervention.

A related dilemma is that of whether to vertically separate the competitive and monopolistic parts of the industry as, for example, advocated by the Hilmer Report (Hilmer *et al.* 1993). Separation makes regulation easier. There is no problem of ensuring that the incumbent and competitors are competing on an equal basis, since the incumbent is not permitted to compete in the final output market. The costs of the separated monopolist are easier to determine for regulatory purposes since they are not embedded in the overall costs of operating the vertically integrated enterprise. The drawback with separation is that if there are economies of vertical integration, they will be lost. These economies are impossible for those outside (and often inside) the firm to measure; essentially, if there is forced separation, the regulator is saying that it knows how best to structure the firm. The fact that firms often re-integrate when they are allowed to suggests that regulators may be sometimes underestimating the economies from integration.

Theory has been useful in indicating the properties of the optimal access price. However, the optimum is the result of a balance of many aspects, empirical evidence about which is very difficult to obtain. The level of the access price, and the desirable extent of vertical separation are issues which are likely to always remain at the discretion of the regulator.

A complexity which is emerging with the implementation of access regulation is that of what to do with Community Service Obligations (CSOs). The price structures of the formerly monopolised utility and transport industries typically embody many cross subsidies. When markets are opened up to competition, these cross subsidies become unsustainable. If governments wish these CSOs to continue to be provided, they need to be funded either directly, through levies on the industry or through markups on access prices. Each of these options has its problems, though the last creates the most difficulties. Thus, for example, coal freight has been overpriced and profits have been used to keep prices down elsewhere on rail systems. If users of coal freight services are able to obtain access to the track at marginal cost or slightly above, they will operate services directly themselves, at a considerable saving. This will have a large negative impact on state railway revenues.

As access price regimes are being implemented, a number of subsidiary issues are emerging. One concerns quality degradation — if the incumbent is price controlled, it may lower the quality of the service it provides to its competitors, partly to save costs, and partly to make them less effective competitors. Disputes over quality are common in access price regulated situations. Another issue concerns how extensively the access framework should be implemented. In some industries the Australian Competition and Consumer Commission (ACCC) has the scope to impose very detailed regulation (eg over land used to store equipment at airports). Detailed regulation will require large amounts of information and will be costly relative to the gains from additional competition.

### 9.2.5 Monopoly price regulation

Access price regulation and final product regulation are to an extent, substitutes. If access to monopoly facilities (electricity transmission and distribution wires) is easy for all competitors (electricity generators), it may not be necessary to regulate the final product (electricity). When the final product (telecommunications) is regulated, it may not be important to ensure easy access to monopoly facilities, since regulation (imperfectly) takes the place of competition. Hence, there is an issue of what balance of access and final product regulation a regulator should aim for.

The preferred form of final product regulation in Australia is price cap (or CPI-X) regulation. Under this form of regulation, an overall price ceiling for a basket of services provided by the firm is set in advance, and it is allowed to change in a predetermined way for a number of years, after which time it is reviewed. This approach was pioneered in the United Kingdom, as an alternative to rate of return regulation which was extensive in the United States.

The weakness of the latter was that it was essentially cost-plus regulation, and gave the firm little incentive to keep costs down. Price caps, by contrast, give the firm an incentive to minimise costs since if it can lower costs, it can add to its profits.

The weakness of price caps is that they impose considerable risks on the firm, and can lead to big swings in profit and loss. Regulators in the United Kingdom have had difficulty with electricity distributors which have achieved very large, and politically uncomfortable, profits even though they have kept within the cap. Periodic revisions of the cap have taken the firms' performance into account, and tightened the cap when the profits are high. To this extent, regulation is reverting towards rate of return regulation. In the United States, there has been a movement away from rate of return regulation, but not a complete move to price -caps. The approach has been to adopt a mixed system, sometimes called sliding scale regulation, which incorporates price caps but also allows for the firm's actual performance in setting prices (Crew and Kleindorfer 1996).

Ultimately, whether they do it formally, as in the United States, or informally, as in the United Kingdom, regulators must determine how much weight they are going to put on the firm's actual performance when setting prices (Mayer and Vickers 1996). As price-cap regulation matures, this is an issue which will become more prominent in Australia.

There are several other related issues concerning the implementation of monopoly price regulation. One of these concerns is that of what level to pitch the permitted prices when monopolies are being privatised — higher prices yield more profit and higher sale prices for governments. As with access price regulation, more attention is being given to incentives to invest; low regulated prices may be good for putting pressure on to reduce costs in the short run, but they may also be a disincentive for investment, and this will lessen efficiency in the long run. Finally, it is being recognised that price regulation leads to incentives to under supply quality; such regulation may need to be accompanied by quality regulation or monitoring (Rovizzi and Thompson 1992).

Price regulation has been reformed extensively overseas. On theoretical grounds, it can be expected to perform better than earlier systems, especially in terms of productive efficiency. So far, however, there has been little by way of empirical assessment of how well it has been performing. There is some weak evidence of an improvement in United States telecommunications (Kridel *et al.* 1996).

### 9.2.6 Light handed or many handed regulation?

One thing apparent from overseas experience and emerging Australian experience is that simple or light handed regulation is something of a holy grail — the solution to one regulatory problem begets other problems and more regulation. It has rarely been possible to implement a few straightforward rules and then leave it at that. There may be some industries that are relatively easy to regulate (gas perhaps?). It is to be expected that industries like telecommunications will be complex. However, even those which seem fairly simple, such as airports and electricity, have given rise to range of complexities which have to be addressed.

For example, with airports, congestion pricing will conflict with price caps, consequently, other devices such as slot allocation schemes, have to be introduced. Noise externalities cannot be handled within the price-cap framework. Major investments like runway extensions, improve the quality of service to users but do not add to revenues — the airport needs to be given incentives to undertake them. In Australia, problems have already developed with the definition of the basket of services to be price capped, and whether services such as refuelling should be included. Airport regulation becomes a complex matter, and the regulator assumes a major role in running the enterprise (Forsyth 1997).

The problem arises because there are many public policy aspects, such as externalities, beyond that of restricting the use of market power, which are present with infrastructure industries. This is especially true when parts of networks are involved. The move to private regulated provision of these services brings these issues into the open. All of them had to be solved when they were provided by public monopolies, but most things were decided in-house, perhaps well or perhaps poorly. While the objective of light handed regulation is not being met, the new approach means that the policy issues, for example with private provision of transport infrastructure, are more out in the open, and the questionable decisions are more in evidence.

## 9.3 The federal dimension

An ongoing complexity in Australia which has implications for utility and transport reform is that created by the federal arrangements in place. States are responsible for many of the industries, either as owners or as regulators. They are also more constrained than the Commonwealth, especially in their taxing powers. Granted that they have been tightly constrained in their revenue sources, the revenue aspects of changes feature more largely in their calculations than they do with the Commonwealth. Thus, privatisation has the advantage of an immediate inflow of revenues, though it lessens the scope for future revenue flows from profits of government enterprises, since private firms are difficult for states to tax. Other aspects of the tax system impinge on their decisions; state owned firms are not subject to corporate tax, whereas private firms are. While imputation partly compensates for this, imputation is not complete, and state governments will lose from privatisation, since the value of the enterprise on privatisation is discounted to allow for the taxes that will have to be paid.

Several of these difficulties created by the federal system have been recognised and addressed. Through the Council of Australian Governments (COAG) process, the Commonwealth has agreed to give grants to the states conditional on their progress in implementing microeconomic reforms, especially those, such as extending competition, which can have negative revenue effects. It remains to be seen whether the payments are more or less automatic or whether they do depend on achieved reform. In general, however, the approach appears to be a practical way around the problems.

## 9.4 Interpreting the results of reform — product and labour market interactions

A good deal of the effect of microeconomic reforms can be summed up in terms of the effects on labour use. To a large extent, a gain in overall productivity is explained by a gain in measured labour productivity. There can be improvements in the use of other non-labour inputs, and there may be a degree of substitution of these for labour. However, the decline in labour use is often the largest reduction in factor use. Also, it is often the case that labour accounts for a high proportion of value added. Since the effects on labour use may be very large, the ways in which labour markets work can be relevant to the outcome of reform. Further, the interactions between product and labour markets can be critical.

### 9.4.1 Measuring productivity change

Many reforms involve a maintenance of the level of output, combined with a reduction in labour input, possibly along with some adjustment in the use of other factors. The consequence is a measured productivity increase; both labour productivity and total factor productivity. The measured effect may overstate the gain in productivity. An effect which could be present and which would be difficult to measure could be a decline in output quality. Another could be a change in working conditions and a rise in the effort put in by employees (Quiggin 1996, Chapter 13).

A real measure of productivity growth would include an allowance for any change in quality and effort. It is difficult to judge how serious these might be in any specific case, and thus how large the genuine increase in productivity is. It is even possible that there is no net gain in real productivity. Typically, in the pre-reform situation there are rents present; for example, from the presence of market power at the product level. The employees have been able to share these, partly through higher pay and partly through easier working conditions, resulting in higher numbers of employees per unit output. Reform squeezes these rents, and forces wages closer to their market levels, and increases effort levels. An alternative explanation is that some reforms, such as privatisation, may cause a change in the firm’s objectives (Haskell and Sanchis 1994). A public firm may include employee welfare amongst its objectives, whereas a private firm is unlikely to do so to the same extent. Privatisation leads to a shift in objectives, and the firm expects the employees to put in more effort to obtain the same pay.

It is not difficult to explain, in general terms, how this comes about. Suppose rents are created and employees are able to share in them. They are not likely to wish to take all of their increase in real income in higher pay. To some extent, they will prefer easier working conditions and less effort. This will also result in greater employment, something which will also be of value to employees as a group. When reform leads to a lessening of these rents, employees lose through less pay, greater effort and less employment. Those who lose their jobs lose through having to accept employment at market rather than above market real wages, or face unemployment. Neither of these latter two losses are picked up in traditional productivity measures.

It is unlikely that all of the measured change in productivity can be explained away in these terms. Often there will be inefficiency, and eliminating this leads to genuine productivity improvements. Indeed, there is a problem of explaining why there is inefficiency prior to reform (see Stigler 1976 on X-inefficiency). If there is slack, why do neither the firm or employees make use of it? Employees, for example, could trade off slack and a small cost in effort, for a much larger gain in wages.

One possibility is that firms with market power are simply wasteful; they do not maximise their profits and allow waste to develop. Alternatively, it may be that employees and firms find it difficult to negotiate an efficient bargain to share rents. Employees seek to increase their real incomes, but they can only do so by accepting excessively slack working conditions, which lessen their effort, but which they would trade off for higher wages if they had the chance. Finally, it could be that the apparent slack is really the employee's efficient choice of wages and effort.

If the last of these is the case, reform does not lead to any gain in productive efficiency. It will lead to some gains in allocative efficiency through the lessening of market power and the reduction of product prices to more efficient levels, but the measured productivity gain would be an illusion. If the first of these is the case, measured gains in efficiency are accurate reflections of the real gains — waste is eliminated and the employees suffer no loss. Reforms such as privatisation or competition force or give incentives to the firm to eliminate waste; this is what is usually assumed in discussions of the effects of reform on productive efficiency. If the second possibility is the case, reform may lead to a measured productivity gain, some of which will be real and some of which will not. What happens depends on labour market as well as product market conditions.

### 9.4.2 Sources of market power — product and labour markets

There can be different degrees of market power at different levels. Market power may exist at the product level, and it may not exist, or be quite weak at the labour market level. Another possibility is that there is market power at the labour market level, but little or no power at the product level. Finally, it is possible that there may be market power at both levels.

Take the pure waste case, often assumed in discussions of product markets, first. This is inconsistent with the existence of market power in the labour market (unless this power is solely exercised in obtaining higher money wages). The firm hires labour at the going wage, but it is simply inefficient at using it. There must be some market power at the product market level, or some other source of rents. A reduction in rents available forces the firm to use its labour more efficiently, at no cost in terms of increased effort to the employees.

With the efficient labour market bargain case, whereby employees take some of their real wages as reduced effort, there must be some market power at the labour market level; employees are able to obtain higher than market wages, some of which they take as reduced effort. There might or might not be market power at the product market level. For example, a group of employees, essential for all firms in the industry, might be well organised and able to command above-market wages. An example might be pilots, essential to operate an airline. All firms in the industry will have to pay these wages; competition at the product market level will not be able to lessen the employees' market power.

The third case is that where employees are able to obtain higher than market real wages, and they take out some of the difference in the form of reduced effort; however, conditions are slack and employees would prefer some increase in effort for higher money wages. There must be some labour market power present for the employees to succeed in raising the wage. There is likely to also be some product market power (or some source of rents), which helps the industry or firm to get away with slack working conditions. The outcomes in terms of wages and productivity depend very much on the strength of market power at both levels.

One possibility is that of strong product market power but some, though limited labour market power. Rents are created at the product market level, and the employees are able to gain a share in these rents. They are able to achieve higher real wages, though it is likely that there will be slack working conditions and productive inefficiency. If there is reform at the product market level, the rents will contract, and the employees will be forced to accept lower real wages. Working conditions will be tightened up, and there will be a gain in measured productivity, some of which will be real. This is a case where product market reform has significant labour market effects.

### 9.4.3 Product and labour market interactions

A good example of this arose with United States domestic airline deregulation. Airline markets were opened up to competition, and the incumbent airlines were faced with entry from new airlines which had higher measured productivity and paid lower wages. They were only able to survive by paying lower wages and improving productivity. Employees had been able to share the rents from regulation, and when it was removed they were not strong enough to avoid real wage reductions. Product market reform was sufficient to achieve productivity gains.

It is instructive to contrast this with Australian airline deregulation. Prior to deregulation, the Australian airlines had lower productivity than the United States airlines (Bureau of Transport Economics 1985). An even larger productivity gain could have been expected if they were able to achieve best practice. In the event, deregulation brought some productivity gains, but they were smaller than those in the United States. There are at least two possible explanations for this. One might be that the product market reform was less effective; the small market, and possibly residual barriers to entry, in Australia led to less new entry and left the airlines as a duopoly. It is possible that the airlines still possess considerable market power, and that the employees are still sharing the rents from this. Alternatively, it could be that the employees are more strongly organised than they were in the United States. If so, even if the airline market were more competitive there might be little additional change in productivity, because working conditions are an outcome of power at the labour market level. New entry would make little difference because new airlines would have to accept the current wages and working conditions, and they would not be able to use lower wages and higher productivity to help them gain a foothold in the market.

It is difficult to know which of these is the case. What is clear, however, is that product market reform is insufficient to deliver the large productivity gains which could have been expected. Other cases in Australia seem to be closer to the United States airline example. Reforms have resulted in substantial productivity improvements. For example, productivity has grown rapidly in the electricity industry (Bureau of Industry Economics 1994), which has initially been corporatised, opened up to competition and in some cases privatised. There is evidence of productivity growth in telecommunications; this is partly due to the ongoing privatisation of Telstra, and partly due to opening its markets to more competition. In each of these cases, there was product market power, and employees shared in the rents to an extent. However, there does not seem to have been strong labour market power, so employees have had to accept a worsening of their working conditions.

Another example of where product market reform is insufficient to achieve efficiency lies outside the utilities/services sector, in the mining, and especially coal mining, industries. Prices are set on world markets, and there is active product market competition. Firms are invariably private, and can be presumed to be keen to earn maximum profits. In spite of this, there is evidence of low productivity in the industry. This can come about through the interaction of two things; rents at the product market level, and market power at the labour market level. It is not clear how strong this is, but it does lead to slack working conditions and low productivity. Since the source of rents is not market power, changes at the labour market level will be necessary to achieve productivity improvements.

The 1998 waterfront dispute is interesting because it poses further possibilities. In particular, it shows how market power at the two levels interact, and it raises the question of who possesses what power in which market. It seems that the employees do not possess much market power at the labour market level; they are unable to stop, at least directly, stevedores from employing non-union labour. The stevedores are a duopoly, though they are not able to prevent new entry. However, to the extent that the union has market power, it may be at the *product* market level. The union may be able to stop new entrants, or firms which wish to use non-union labour, from being able to *sell* their products, though it may not be able to stop them producing without union labour. It is attempting to do this by making access to and from wharves difficult, and through international pressure on ship operators to discourage them from using specific stevedores.

This amounts to an example of employees who may not have much direct *labour* market power, under current laws, attempting to use their power at the *product* market to raise prices and create rents which can be used to improve their working conditions and raise wages. This is the reverse of the more usual case of the firm with market power sharing its rents with its workforce. Here it is the case of the firms being able to share in the rents created by market power at the product level possessed not by themselves but by their employees. The stevedoring companies do not appear to have been especially keen to improve productivity and reduce costs over the past decades; cost reductions they might have achieved probably would not have accrued to them. It has been mainly users of their services who have been concerned about costs and productivity. In this case, opening up the labour market, and implementing competition policy at the product market level will be insufficient to achieve efficient outcomes in the industry; this is because there is market power at the product level, possessed by the employees, and this power will remain, allowing scope for low productivity and high costs.

## 9.5 Conclusions

Reform is well under way in the utilities and transport services industries, and in some cases it is nearly complete. There are two types of issues which arise as a consequence of reform. The first is the detailed one of how reform can be implemented most effectively, and the second is a general one of how successful it has been and what are the determinants of its success.

There are many problems of implementation that have emerged as industries have been subjected to reform. Some of the questions that arise are never likely to be answered authoritatively; for example, should an integrated industry like electricity be subjected to vertical disaggregation? Other questions can be answered more scientifically, though there still will remain considerable scope for discretion. For example, these include questions of how high access prices should be set, or how prices of monopolies can best be regulated.

The second issue concerns the success of reform, and what has determined why reform has succeeded more in some cases than others. Reform has been going on long enough for the results to be evaluated. This has not been done very thoroughly, though it should be a priority. There has been a tendency to subject one industry to reform, and then move on to the next industry, without much assessment of results. In some cases, the gains appear to have been less than anticipated.

To resolve this issue, it is necessary to explore further the sources of inefficiency, and to assess the possible extent of genuine productivity gain. The existence of rents enables inefficiency to persist, and it is necessary to examine the source of the rents. These can be at the product market level or the labour market level, or both. In understanding the outcome of reform, it is important to determine what is going on at both these levels, and how they are interacting. Extensive reform at the product market level may deliver little by way of gain; it may be a necessary but not sufficient condition for achieving efficiency. Likewise labour market reforms may not deliver. In several cases, such as domestic airlines and the waterfront, there is a complex interaction between the different levels, and it is necessary to explore these to determine what is going on.

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## **Discussant** — *Denis Lawrence*

Peter Forsyth's paper provides a comprehensive treatment of the policy issues associated with microeconomic reform, particularly as it affects the reform of government enterprises. Rather than summarise Forsyth's paper, I want to make a couple of general observations on the reform process and then quickly illustrate a few key points by reference to empirical examples.

First, it is important to bear in mind that the reform process is a long one. Reform is usually not something that just happens over a few years and is necessarily easy to measure quickly after the event. Forsyth made the point that many of the productivity changes, particularly in electricity, occurred before the reform process started. However, it is often very difficult to define exactly what the reform process is and, consequently, when it started. I certainly take a wide definition of reform. For instance, in the case of the electricity industry in Australia, the reform process effectively started in the early 1980s. That was a number of years before the formal government process of corporatisation started. Rather, the reform process started in Queensland following the South East Queensland Electricity Board (SEQEB) strike and was greatly aided by some dynamic managers who introduced internal changes within the both Queensland Electricity Commission (QEC) and the distributors. We need to take a longer view of some of these reform processes when we talk about measuring their effect.

Another lesson we have learnt from the reform process is that the sequencing of reforms is very important. Forsyth quite rightly highlights labour market issues. I think in a number of cases we have rushed in and made product market reforms without making sufficient changes to the labour market first. The labour market situation has then frustrated a lot of those reforms.

We also need to adopt a more holistic approach to reform in Australia. We tend to have a bit of an 'If it is Tuesday, it must be Belgium' approach to reform here, particularly in the coordinating departments. By this I mean there is a tendency to look at a particular reform and say, 'Okay, we have been there, done that. Let us move on to the next one.' As we found last year, it is not even safe to assume that old debates like those surrounding tariff reductions are over and won. The reform process is an ongoing process of education and winning the hearts and minds of the community. We have to keep the big picture in view and keep stressing how all the individual issues are contributing to achieving the overall objective. This is where productivity measurement and international benchmarking, in particular, have an important role to play.

It is also important to bear in mind that in the reform process we are dealing with moving targets. We cannot say reform is complete if we have managed to catch up to someone at one point in time. You can bet your life that competitors will be continuing to move ahead and we have to keep matching or, preferably, bettering their performance to remain competitive.

In Australia, we have tended to underestimate the power of incumbency. One need only look at our experience with airline deregulation to see this.

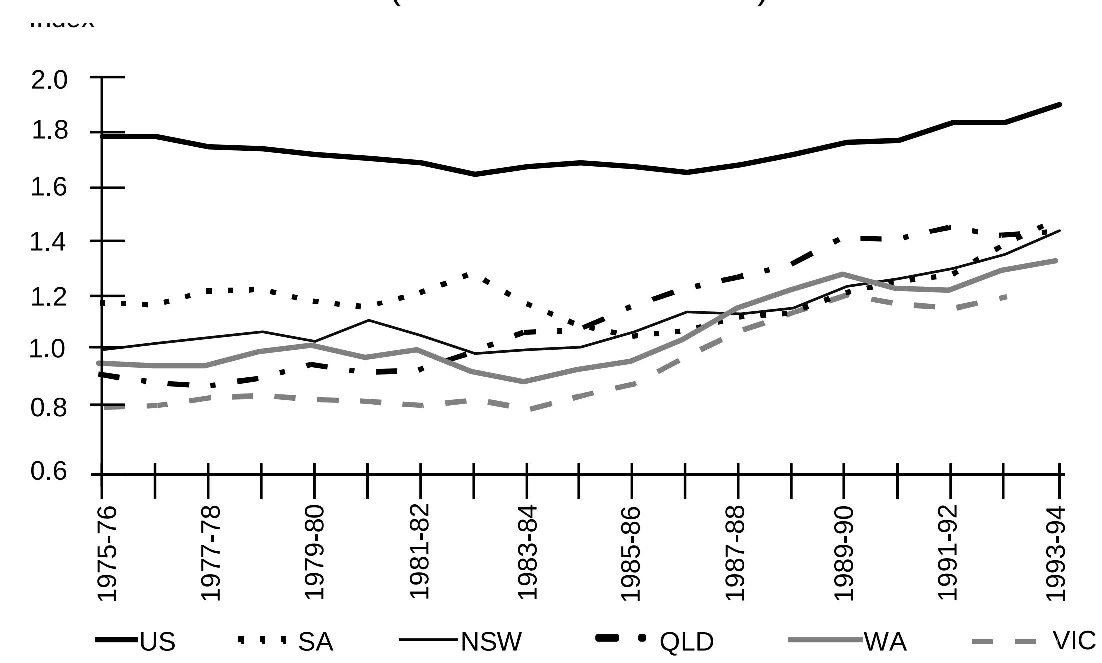
We also have a problem with what I call real and ‘Clayton’s’ reforms. In some cases, for instance electricity in Victoria, we can see that very worthwhile reforms have been implemented. However, when they have been put under pressure to make reforms some of the other states have learnt the game of being seen to make changes without making the fundamental changes that they should. Changes to the electricity industry in New South Wales are a good example of that.

A major omission in Australia’s reform process is that we have not implemented data supply and collection mechanisms to ensure that we can evaluate the success of those reforms later on. One criticism I would make of the Victorian reforms is that there are now significant problems obtaining data from some of the privatised electricity utilities. In future, we need to build supplying data in as a prerequisite for the restructured industry.

The final general point I want to make is that we need to do a lot more work looking at what is achievable best practice given our particular situation. We have devoted significant resources to measuring productivity change and where we lie relative to international best practice. However, many issues concerning ‘like-with-like’ comparisons and just what proportion of observed gaps to international best practice are actually under management control remain to be resolved.

Moving on, I want to look briefly at three empirical examples. The first concerns multilateral comparisons of electricity total factor productivity between the Australian states and the United States investor–owned utilities presented in Figure 9D.1. This graph can be used to illustrate a number of points. First, as mentioned earlier, Queensland has been the traditional Australian leader in electricity. It really started to improve its performance back in the early 1980s, long before the formal government reforms started. Second, it is critical to distinguish between productivity levels and growth rates. The United States utilities have represented best practice throughout the 19 year period. However, until the early 1990s, the United States was either stagnant or going backwards because of the impact of increasing environmental restrictions and bad nuclear investments. If you looked at performance in terms of growth rates the United States looked to be doing badly. Australia’s growth rate was much higher but it was because we were starting from much lower productivity levels and making easy catch-up gains. In terms of productivity levels, Australia remains significantly behind the United States. Finally, from the early 1990s the United States utilities' productivity growth rate started to pick up dramatically again illustrating that best practice is a moving target.

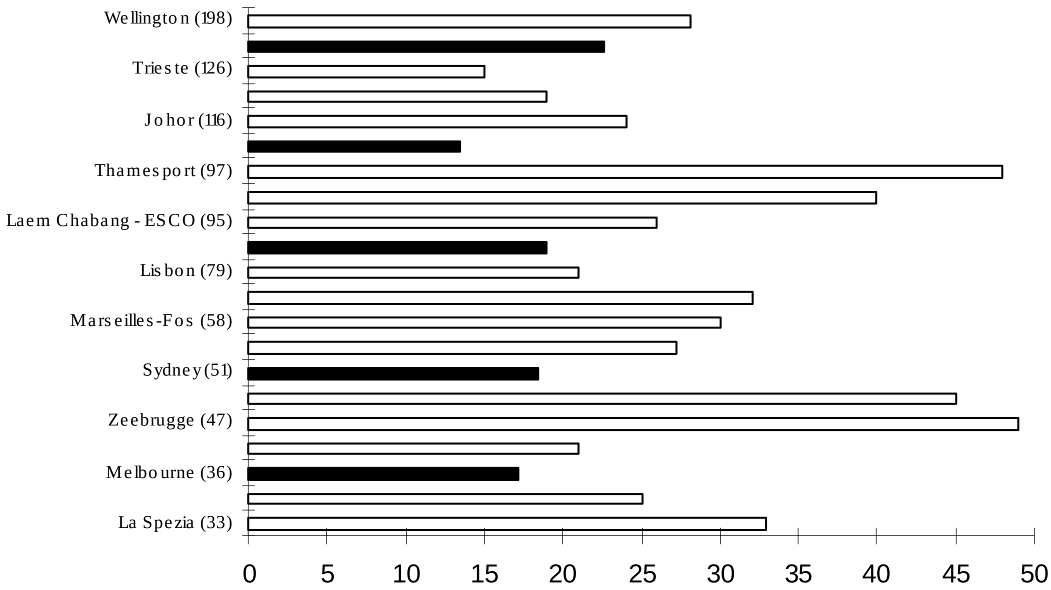
Figure 9.D1: **Electricity multilateral total factor productivity for Australian states and the United States, 1975–76 to 1993–94**[a] (index NSW 1975–76=1)




a Victorian data for 1993–94 are not available.
*Source:* BIE (1996) and Swan Consultants (Canberra) 1991.

The second example is Australia's waterfront performance. This is an area that is absolutely critical for Australia to improve. Figure 9D.2 presents the ship working rate which is the closest we get to an overall summary measure in this industry. It takes account of the crane rate, which is a capital productivity measure. It takes account of work practices in the form of idle time between shifts, strikes and go-slows. It also takes account of the number of cranes per ship. The ports covered are of comparable size to the Australian ports. Australia's performance can only be described as woeful. Our ship working rate is in the range of about 15 to 20 moves per hour while best practice in similar sized ports is more like 45 to 50. This situation needs to be fixed urgently as it is currently costing us dearly.

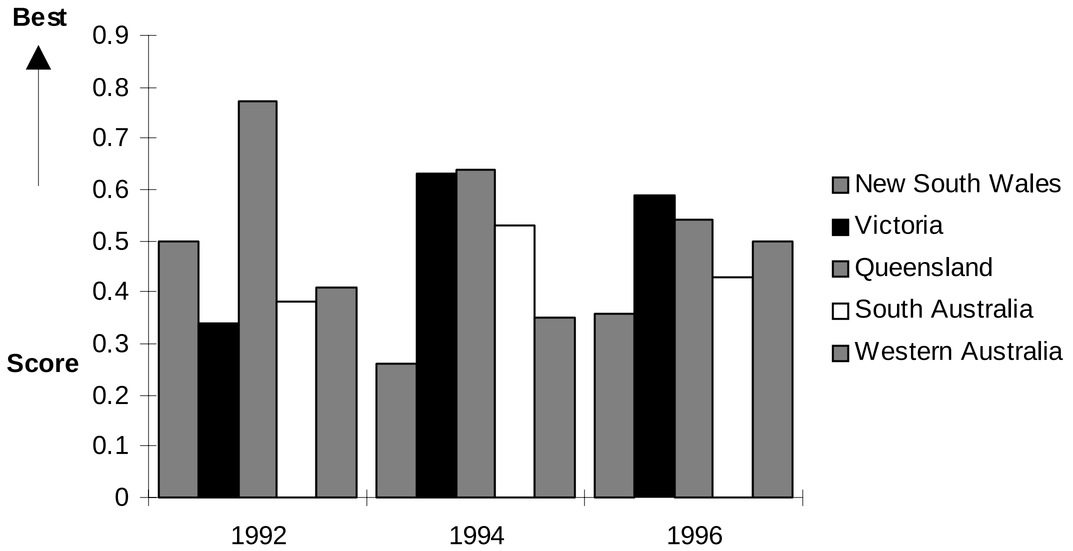
Figure 9.D2: **Ship working rates (elapsed rate[a]) by container port,[b] 1994** (moves per hour)




a These estimates are not directly comparable to the elapsed rates published by the BTCE. The estimates here are based on moves per hour whereas the BTCE's estimates are based on twenty-foot equivalent units ('teus') per hour. The data for this figure is contained in Table F9. The numbers in the brackets represents the port's 1993 world ranking by container volume.
b The survey information is supplemented by published information on the European ports for 1993.
*Source:* STM (1995).

The final example shows that if you have a government that is serious about reform, then even in capital-intensive infrastructure industries you can achieve significant performance improvements in a fairly short space of time. Figure 9D.3 presents the Tasman State Infrastructure Productivity Scorecard, a composite indicator of capital and labour productivity across a basket of four industries — electricity, gas, rail and the waterfront. In 1992, Victoria was the laggard being the worst performer in terms of productivity. By 1996, because of its more aggressive reform strategy it was the productivity leader. In 1992, Queensland was the unambiguous productivity leader. Its lead appeared almost unassailable. However, it has been slow to move on reform and by 1996 had fallen back to a marginal second place. New South Wales has also been slow to move on many areas of infrastructure reform and now languishes in last place.

Figure 9.D3: **Tasman state infrastructure productivity scorecard, 1992 to 1996** (index=1 if a state had highest productivity score in each infrastructure category)




*Source*: Tasman State Infrastructure Scorecard database and BIE (1995a).

In conclusion, Australia has achieved much in infrastructure reform over the last decade. However, the performance of our infrastructure industries is still somewhat patchy in an increasingly competitive world and much remains to be done.

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## **Discussant** — *Roger Carrington*

Peter Forsyth's paper highlights the mixed performance of government policies that aimed to increase the productivity of the utilities and transport services — both in Australia and overseas. However, Forsyth does not comment on the recent reforms to core government services in Australia, such as health, law and order, and education, which account for about 20 per cent of gross domestic product (SCRCSSP 1997a).

This review will briefly describe the New South Wales (NSW) Government's financial reforms to improve the performance of all government agencies. It also presents NSW Treasury's initiatives to measure performance of government agencies to re-enforce Forsyth's view that it is important to measure the progress of microeconomic reforms to ensure they deliver increased living standards to Australians. The review will also address some of Forsyth's comments on the privatisation of electricity assets in New South Wales, and the extent of the reforms to the utilities and transport services.

The main financial reforms introduced by the NSW Government are an approach whereby the Government will fund services that assist in the achievement of broad objectives of policy, and a financial framework that encourages government trading enterprises (GTEs) to mimic commercial behaviour analogous to private enterprises with similar risk. Performance measurement is necessary to complement the financial reforms to help ensure government agencies become more effective and efficient because most government services are not traded in competitive markets. Performance measures provide information that makes government agencies more accountable to Parliament and the broader community. They also promote yardstick competition in the provision of government services that face little competition.

Treasury monitors the financial performance of GTEs by focusing on financial ratios such as capital structures, rates of return and dividends. However, these accounting-based measures have several deficiencies — for example, they ignore the cost of capital. This has led Treasury to introduce a broader measure of performance.

Shareholder value added (SVA) is the net operating profit of a GTE after tax less a charge on debt and equity. By focusing on this measure, a GTE is encouraged to maximise its value to the Government. However, improvements in SVA may not be associated with improved productivity. For example, a GTE may improve SVA through monopoly pricing. Alternatively, a GTE's SVA may remain low despite improvements in productivity because it does not adequately recover its costs. This situation can arise from adverse price determinations from regulatory bodies. Therefore, to gain a better understanding on the performance of GTEs, Treasury is investigating the use of extending total factor productivity (TFP) measurement to determine the relative contribution of productivity improvements and price recovery to a GTE's profit (NSW Treasury 1997a).

NSW Treasury uses the effectiveness and efficiency indicators developed by the Steering Committee for the Review of Commonwealth/State Service Provision to help improve the performance of major government service providers, such as the Police Service and the Department of Health (SCRCSSP 1997a). However, the Steering Committee's efficiency measures are restricted to unit cost or partial productivity measures, which can vary for reasons other than inefficiency. For example, a hospital's unit cost may vary because it has a different mix of patients compared to other hospitals. Consequently, Treasury is using data envelopment analysis (DEA) to obtain better measures of efficiency for government service providers (Carrington *et al.* 1997).

DEA is a linear programming technique that combines information on a government service provider's services (outputs) and its inputs to provide a single measure of efficiency. The measure is calculated by comparing the government service provider's mix of outputs and inputs with other government service providers that have a similar mix of outputs and inputs. For example, DEA would compare a country hospital with other country hospitals; it would not compare a country hospital with a metropolitan hospital.

The technique can identify whether the main source of inefficiency for a government service provider is its scale of operations or its managerial ability to convert inputs into outputs. Moreover, DEA can incorporate environmental variables, such as the wealth of clients, that influence the efficiency of the service provider but are beyond its control. If panel data are available, DEA can determine if the government service provider could increase productivity by adopting better technology or by improving efficiency. The Steering Committee for the Review of Commonwealth/State Service Provision (1997b) provides a comprehensive explanation of DEA and presents case studies on the technical efficiency of NSW police patrols, minimum security correction centres (prisons) and motor registries to illustrate the use of the technique. Further information on Treasury's initiatives to measure the performance of government agencies is presented in Carrington, Connolly and Puthucheary (1997).

Forsyth does not consider the arguments that are advanced for the privatisation of electricity assets in New South Wales convincing because the Government can 'use the resultant funds unwisely'.

The central issue of the privatisation debate is whether the opportunity cost of using the revenues from the sale of the electricity assets for other infrastructure projects and retiring Government debt is greater than retaining the electricity assets in public ownership. Moreover, major new investment or asset maintenance proposals in New South Wales must be supported by cost-benefit analysis and be approved by the Government (NSW Treasury 1997b). Once a project is approved, the expenditure for the proposal is included in the Budget and the Budget Forward Estimates. Therefore, the Government and the community have a clear understanding of the economic merits of the proposal and its impact on the Budget. This limits the scope for the Government to waste money. Furthermore, the Government is aware that undisciplined expenditure can adversely affect its credit rating.

Finally, Forsyth argues that the reform of the utilities and transport services is well advanced and in some cases almost complete. However, in a dynamic global economy, countries continue to set better benchmarks for producing goods and services. Therefore, Australia must strive to meet these new challenges otherwise its living standards (as measured by GDP per capita) relative to other countries may slip. International benchmarking studies of local infrastructure industries by the Bureau of Industry Economics (1995) suggest that some industries, such as electricity supply and telecommunications are moving towards world best practice. However, the performance of other industries, like waterfront container handling, has declined.

To conclude, Peter Forsyth's paper raises two important issues. First, measuring the influence of reform to the utilities and transport services is important. This information allows people to assess if the reforms help improve the productivity of the Australian economy. Furthermore, the performance measures for these industries can stimulate debate on the merits of reforming other sectors of the economy.

Second, performance indicators need to be interpreted with care. Unit cost and partial productivity measures can vary for reasons other than inefficiency. More comprehensive measures of performance, such as TFP measurement and DEA, are vulnerable to errors in the measurement of variables. And, it is often difficult to allow for differences in the quality of the services produced by economic agents in these analyses.

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## General discussion

The discussion focussed on the following themes:

- privatisation and the real cost of public capital;
- the effect of outsourcing on total factor productivity estimates; and
- the quality of management.

### Privatisation and the cost of public capital

One participant suggested that a useful way to conceptualise privatisation was in terms of the public sector balance sheet. The suggestion was that the spate of privatisations that were occurring world wide were a response to a rise in the real cost of public capital. As a result, governments were reducing their assets in order to reduce their liabilities.

### Outsourcing

The effect of outsourcing on productivity estimates was discussed. Outsourcing tended to involve shifting low productivity workers out of one industry, but hiring them, or similar workers, back as external contractors. The labour productivity of the contractor industry would be raised while labour productivity in the industry to which the low productivity activity is transferred (the contractee industry) would tend to fall. The outsourcing of hospital cleaning from the health services sector to the private cleaning sector in New Zealand was provided as an example. Peter Forsyth responded by noting that in the presence of outsourcing, labour productivity measures provide a biased picture of sectoral productivity growth. He concluded that the use of labour productivity measures should be avoided as far as practicable. Total factor productivity measures which include contracting out as a service input provide a more comprehensive measure of productivity growth. Dennis Lawrence agreed, noting that these effects were often identified in ‘other services’ categories in total factor productivity studies.

### The quality of management

The quality of management was highlighted by one participant as an important factor in productivity performance. As an example, it was suggested that the superior container stevedoring performance at the Port of Adelaide compared with the Port of Melbourne was due to better management at the Port of Adelaide. In particular, the detection of ‘shirking’ and the removal of incentives for workers to maximise overtime were cited as indicative of different management outcomes at the two ports. Forsyth noted that this raised a further question: 'why weren't the incentives in place for improved management at the Port of Melbourne?' This remains an area for further research.

# 10 THE EFFECTS OF MICROECONOMIC REFORM IN TELECOMMUNICATIONS

*Robert Albon*

## 10.1 Introduction

The previous Labor government — at least in its view — completed its program of macroeconomic reform in the late 1980s and then embarked on two other economic reform programs — the liberalisation of international trade and finance and (what soon came to be known as) 'microeconomic reform'. The impetus for these flowed, respectively, from the resource misallocation arising from high levels of protection of, in particular, Australian manufacturing; and very inefficient provision of most infrastructure services in energy, transport and communications. In relation to these services, as stated by Paul Keating in *One Nation*:

> When this Government came into office the problem of inefficient performance was endemic in areas shielded from competition – including domestic aviation, electricity supply, shipping, railways, and telecommunications. The effect was higher costs, poor service and inefficient allocation of resources in the economy. As in all developed economies, these industries provide vital inputs to all our major export and import competing sectors. Australia was placed at a considerable disadvantage in competing against imports at home and in export markets. (Keating 1992)

The first reform process reinforced the second. Trade liberalisation meant that Australian importers and exporters were forced through reduced protection and subsidisation to lower their costs if they were to remain competitive with producers from other countries. But they had to purchase inputs like electricity, telecommunications services, transport and handling from seriously inefficient government-owned suppliers.

The old Telecom monopoly provided reliable and increasingly sophisticated services to business and residential users, but there were problems. Far too many resources than necessary — around 40 per cent or more — were used in producing these services. Business was forced to subsidise residential users through a highly-politicised and inefficient pricing structure, and urban users subsidised rural ones. Further, it appeared that users had to wait too long for new technologies and services to become available. These features clearly had adverse economic effects retarding local productivity and international competitiveness, and imposing unnecessary costs on households both directly and indirectly. Measures to improve performance of the telecommunications sector became an increasing priority as the 1980s proceeded.

Microeconomic reform in Australian telecommunications commenced seriously in the late 1980s with the 'Evans reforms'. These involved a form of corporatisation, liberalisation of value added services and customer premises equipment, and the introduction of independent regulation. This developed with the 'Beazley reforms' of the early 1990s introducing structural changes, duopolistic network competition (a triopoly in mobiles) and more sophisticated regulation. Since then there have been further regulatory changes, removal of the carrier duopoly and partial-privatisation of Telstra. These reforms are reviewed in Albon, Hardin and Dee (AHD 1997, Chapter 6) and are summarised and updated in the next section of this paper.

This paper contains a consideration of the implications of these reforms on each of the telecommunications industry itself, other sectors of the economy and the economy in general. The investigation involves consideration of three possible links stemming from the process of microeconomic reform in telecommunications. First, there is the possible link between microeconomic reform and higher productivity and innovation in telecommunications. It will be argued that there is considerable evidence of this link and that the improvements seen would not have been possible under the old Telecom monopoly regime.

Second, there is consideration of the connection between productivity growth in telecommunications and prices of telecommunications services; both overall and for particular services. Price-capping and other influences have combined consistently to lower the weighted average of real telecommunications prices. However, sub-caps, particular regulations and pockets of monopoly power resistant to competitive forces have meant that some prices — especially long-distance, international, mobile and fixed-to-mobile calls — are still well above costs of provision, while others like customer access prices and directory assistance are inefficiently low relative to costs.

Third, there is the issue of the impact of these price changes in telecommunications on the productivity of the rest of the economy. This area has not been well researched. Consideration of this impact will include a review of studies of the efficiency effects of telecommunications pricing changes and of the sectoral impact of productivity improvements using computable general equilibrium (CGE) modelling procedures.

## 10.2 Microeconomic reform in Australian telecommunications

### 10.2.1 Origins of Telecom from the PMG

Until 1975, Australian domestic telecommunications services were provided by an operating unit within a government department, the Postmaster-General's Department. The operating unit, the Australian Post Office (APO), had a complete statutory monopoly precluding virtually all activity by any private or government-owned bodies. Mail services were also operated by the APO. International telecommunications services were the exclusive province of the Overseas Telecommunications Commission (OTC).

The original 'Telecom' (initially the Australian Telecommunications Commission) resulted from the separation of the telecommunications and postal parts of the operational section of the Postmaster-General's Department in 1975, and its removal from departmental operation. These changes followed the (Vernon) Commission of Inquiry into the Australian Post Office (1974) Report recommendations. Telecom remained under full government ownership and continued to have a statutory monopoly on all aspects of the provision of telecommunications services, including customer premises equipment (CPEs) and value-added network services (VANS). While Telecom was subject to pricing regulation and other constraints on its operations by government, Telecom itself acted as the 'technical' regulator of the industry.

The OTC had been established in 1946 with sole responsibility for handling Australia's overseas telecommunications traffic. Domestic reticulation of that traffic was handled by the APO and later by Telecom. The Australian domestic communications satellite system (AUSSAT) was formed in 1981 to own and operate Australia's communications satellite, with a 'foot print' coverage including some of Australia's near neighbours. AUSSAT's functions included broadcasting and the provision of private network services involving interconnection with Telecom's network for the origination and termination of calls.

### 10.2.2 Corporatisation and the Evans reforms

Corporatisation of the then Telecom in the late 1980s gave it a substantially more commercial focus, with much greater operational freedom, clearer objectives and a more business-like structure. However, it did not involve structural division into arms-length business units. The 1988 Ministerial Statement (Minister for Transport and Communications 1988) resulted in the opening up of most CPE and VANS areas to competition, formalising a trend commenced by Telecom itself during the 1980s. Responsibility for regulation was removed from Telecom with the formation of an independent industry-specific regulator, Australian Telecommunications Authority (AUSTEL).

AUSTEL commenced a form of more ‘light-handed’ pricing regulation based on a ‘CPI–X’ price cap (restricting the increase in the weighted average of a basket of telecommunications services to rise no more than the CPI less a specified percentage) with individual sub-caps on some prices. A requirement for uniform geographic pricing remained, meaning, in particular, that subscriber trunk dialling (STD) prices were based on distance and time of day, without any allowance for density or thickness of traffic on the route.

### 10.2.3 The Review of Ownership and Structural Arrangements (ROSA) reforms

The next ROSA review occurred during 1989–90. The report was not published, although Fanning (1992) provides a summary of its considerations. ROSA was concerned with the relationships between the then three carriers — Telecom, OTC and AUSSAT — and not with structural issues internal to any of the carriers. ROSA, combined with other considerations, culminated in another Ministerial Statement (Beazley 1990). The principal decisions conveyed in this statement or made around this time were as follows:

- Telecom was amalgamated with OTC. The merged carrier was initially called the Australian and Overseas Telecommunications Corporation (AOTC) and later was named Telstra. An International Business Unit continued OTC’s role within AOTC/Telstra;
- AUSSAT was fully privatised, with a complete carrier licence attached to the sale;
- the issuing of this licence allowed network competition between AOTC and the second licensed carrier, with a guarantee of no new competition until 1997. The purchaser of AUSSAT, Optus Communications, was guaranteed regulated access to AOTC’s local network to reticulate its calls, with AUSTEL as the regulatory body. Optus was also licensed to operate a second mobile telecommunications service;
- a third mobile licence was allocated. This was subsequently attained by Vodafone which chose only to operate a digital mobile service. Telstra and Optus offer both digital and analogue services, although Optus buys its analogue capacity from Telstra and acts as a re-seller; and
- licences were granted to various service providers (SPs) offering VANS and re-selling services purchased from AOTC.

### 10.2.4 Telstra's structure

Telstra's structure has changed considerably in the years following the splitting of postal and telecommunications services and its removal from departmental control in 1975. It has progressively been subjected to more competition, been corporatised, and assumed more functions, partly through technological change and partly from the amalgamation with OTC. It has moved from what was still a state-based management structure to one based more on functions, and this evolution is continuing. However, Telstra still retains a largely 'integrated' organisational structure.

Telstra is divided internally into eight business units:

- Commercial and Consumer;
- Business and International;
- Retail Products and Marketing;
- Network and Technology;
- Finance and Administration;
- Regulatory and External Affairs;
- Employee Relations; and
- Telstra Multimedia Pty Ltd. (Telstra *Annual Report 1997*, pp. 14–15)

The divisions and sub-divisions do not operate separately as independent profit centres. Transactions conducted between them are not at 'arm's length', and all are ultimately responsible to the one Board of Directors.

### 10.2.5 Access Arrangements

When network competition in telecommunications commenced, the AOTC was obliged to allow the second carrier, Optus, access to its network for the purpose of originating and terminating its long-distance and international calls at the local network level. Under the initial competitive regime, the local network (including the customer access network or CAN) was viewed as an 'essential facility' for the final distribution of the second carrier's long-distance and international calls. Optus initially established only its own long-distance network, relying totally on AOTC for local reticulation of its calls.

When Optus commenced its plans for entry in 1991, the two carriers could not agree on the conditions of access, and AUSTEL was instructed to report to the Minister on the conditions under which Optus would be allowed to interconnect (Australian Telecommunications Authority 1991). The interconnect agreement was determined on the basis of directly attributable incremental cost (DAIC), although AUSTEL did include some CAN costs — which are not incremental — in the determination. The price determined accorded loosely with long-run marginal cost (King and Maddock 1996, p. 144).

AUSTEL later developed a model of accounting separation involving confidential product-based financial statements through the Chart of Accounts (COA) and Cost Allocation Manual (CAM). The COA/CAM statements assist AUSTEL in arbitrating over disputes involving interconnection into AOTC/Telstra's local network.

As Optus’s and other competitors’ activity increased, Telstra’s share of some markets decreased, giving rise to the possibility of access agreements becoming based on commercial negotiation. Commercial negotiation without regulatory backing was mandatory where Telstra lost ‘dominance’ in a particular market. This only happened in mobiles (1994) and international (1996), but Telstra had a strong interest in proving loss of dominance in other areas. Loss of dominance also meant that Telstra could offer prices other than those in published tariffs. Consequently there was substantial attention to definitions of dominance.

### 10.2.6 Regulatory arrangements since 1 July 1997

There are three main elements to the new regulatory regime that came into force in the middle of 1997. First, with respect to access, where commercial negotiations fail, the Australian Competition and Consumer Commission (ACCC) — not AUSTEL — plays the arbitration role. Under arbitration, the primary focus of the access regime is ‘to promote long term interests of end users’ and the criteria are supposed to give ACCC ‘clear guidance’. The explicit criteria include ‘the direct costs of providing access’, and ‘the economically efficient operation of a carriage service’. Further, the Minister may intervene with guidelines to assist the arbitration process. These are binding and no access undertaking or agreement in existence can be incompatible with them. A new body, the Australian Communications Access Forum, can recommend telecommunications services for declaration by the ACCC. The ACCC (1997) has accepted total-service long-run incremental cost (TSLRIC) as the basis for considering access prices.

Second, telecommunications is no longer exempt from Part IV of the Trade Practices Act. Such exemption — traditionally a feature of Australian telecommunications regulation — was provided in the *Telecommunications Act 1991*, and that Act contained telecommunications-specific competition rules. The new Part XIB of the Trade Practices Act continues specific competition rules for telecommunications. This Part is aimed at allowing ACCC to act more quickly against anti-competitive conduct than it could under Part IV. In contrast to the old legislation, there are no restrictions on 'normal competitive conduct'. This introduces ambiguity into the operation of the Act. Competition notices issued by the ACCC which notify contravention of 'the competition rule' are 'effects-based', not reliant on a 'purpose test'. The intention is that eventually there will be no specific competition rules for telecommunications. The Minister will have to make arrangements to review Part XIB — with a view to its partial or total removal — before 1 July 2000.

Third, the specific prohibition against pricing discrimination by Telstra that was contained in the 1991 Act has gone, replaced by the general limitations on anti-competitive behaviour of the 'competition rule' outlined in the paragraph above.

Meanwhile, existing price capping regulation continues, but is now administered by the ACCC. Timed local calls are essentially banned and the Minister retains direct powers over variations in prices not covered by the price capping regulations.

### 10.2.7 Partial privatisation of Telstra (1997)

One-third of Telstra was sold in a public float in late 1997. The Government has recently announced it intends to sell the remaining two-thirds of Telstra if re-elected.

## 10.3 Measurement of productivity in Australian telecommunications

Various measures of productivity in telecommunications have been applied, but there are difficulties in measuring both inputs and outputs. Both types of measure have been applied to Australian telecommunications; both for the purposes of measuring productivity change over time and for making comparisons with telecommunications suppliers in other countries.

The Industries Assistance Commission published a paper on total factor productivity in telecommunications in 1989. The Bureau of Industry Economics (1992, 1995a and 1995b) conducted a series of benchmarking studies on telecommunications productivity in the first half of the nineties as part of its international performance indicators research program. The Industry Commission has resumed this work, although it is apparently focussing on pricing comparisons rather than on productivity.

### 10.3.1 Difficulties with measuring productivity in telecommunications

The telecommunications industry produces a variety of outputs using a variety of inputs. There are difficulties in measuring both outputs and inputs. Measures of output can be related to a particular input (partial productivity) or all inputs (total factor productivity). Mainlines per employee is a popular productivity measure, but has substantial difficulties in practice. Foreman-Peck and Manning (1988) discuss the major difficulties with this measure. One important deficiency is that mainlines (essentially exchange access lines) is a measure of capacity rather than output. It is what these lines carry that is important. Revenue (ie the sum of prices multiplied by quantities) is an alternative measure of output, but this also has difficulties including the artificial inflation of prices by monopoly carriers. The input side is also fraught with difficulties. An apparent rise in productivity by any per-labour input measure could simply be as a consequence of the addition of inputs other than labour, not a real rise in labour productivity. The measure also has to be adjusted where outsourcing is used. Total and multiple factor productivity measures are an attempt to overcome some of these difficulties, but these measures share many of the limitations of partial measures.

### 10.3.2 International productivity comparisons

International comparisons consistently found that productivity was below that in many other countries, including those where geographical conditions were similar. Consider the following rankings of Telstra in the years indicated:

- 11th of 11 countries on partial labour productivity (1992),
- 7th of 11 on partial capital productivity (1992),
- 8th of 11 on multifactor productivity (1992),
- 19th of 27 on revenue per employee (1993),
- 26th of 30 on lines per employee (1993), and
- 7th of 28 on revenue per line (1993). (BIE 1995b)

The Bureau of Industry Economics (BIE) concluded that the:

> unequivocal message ... is that labour productivity remained low by international standards up to and including 1992–93 ... [and that] the analysis raises some concern as to ... the distance between ... recent public telecommunications infrastructure operating performance and international best practice. (BIE 1995b, p. 49)

This conclusion is supported by Xavier and Graham (1995) in a paper prepared for AUSTEL. They conclude that:

> Telstra's efficiency performance remains mediocre when compared against the world's benchmark carriers. While ... Telstra's exact positioning [is] open to protracted disagreement, there will be less disagreement that a performance gap exists. Indeed, Telstra itself does not dispute such a gap (p. 36)

Telstra's chair in the *Annual Report 1994-95* reported that:

> ...[p]ressure on Telstra to be at world's best practice in every facet of its operations continues unremittingly. While gaps against this standard have been closed appreciably ..., there remains some way to go in a number of areas before ... [we] can claim to be genuinely competitive. Significant and dramatic improvements are still achievable ... .

In 1996, Telstra's CEO stated that on operating expenses per access line there was 'no secret that we are 35 per cent from where we ought to be' ('Blount and to the point on sale', *Australian Financial Review*, 28 June 1996). (This represents about $3 billion in excess costs.) The 1996 and 1997 Annual Reports contain progress reports on the reductions in costs achieved. In 1998 Mr Blount was reported as saying that Telstra: 'is ranked just better than median, measured by operating expenses per access line' ('Telstra buyback call likely', *Australian Financial Review*, 21–22 March 1998).

### 10.3.3 Productivity growth

There is some evidence that productivity growth has accelerated since microeconomic reform began in the late eighties and early nineties. This is indicated from the data on fixed line services per employee, fixed line plus mobile connections per employee, and on the basis of available multiple and total factor productivity estimates.

#### *Basic access lines per employee*

Published estimates of lines per employee by the Steering Committee on National Performance Monitoring of Government Trading Enterprises (1995, 1996) are based, for historical reasons, on the number of fixed lines; excluding mobile subscribers. This ratio increased from 93 to 133 in the period 1989–90 to 1993–94 — an increase of 47 per cent, but levelled off in 1994–95 following political interference in Telstra's rationalisation plans. Telstra commenced publishing data on 'basic access lines per full time equivalent employee' in its 1996–97 Annual Report. This is not strictly comparable with the Steering Committee's measure. This figure was 102 in 1994–95, 103 in 1995–96 and 121 in 1996–97.

### *Fixed line plus mobile services per employee*

On another indicator of productivity — fixed line plus mobile connections per employee — Telstra's record is of slow growth until the late 1980s and one of more rapid improvement from the late 1980s to 1996–97, with a lull in the mid-1990s followed by a resumption of historically rapid growth. Data published by the BIE (based on the number of mainlines plus mobile subscribers) finish in 1993 (BIE 1995a, Table 5.3), at a time when the number of mobile subscribers was relatively small compared with the number of fixed lines. While not strictly comparable with the earlier series, it is possible to construct a series for fixed line and mobile telephone connections per full time employee for the entire period from 1979–80 to 1997–98 (Figure 10.1). This clearly shows an acceleration in productivity when the reforms began in the late 1980s and especially since the commencement of network competition in the early 1990s.

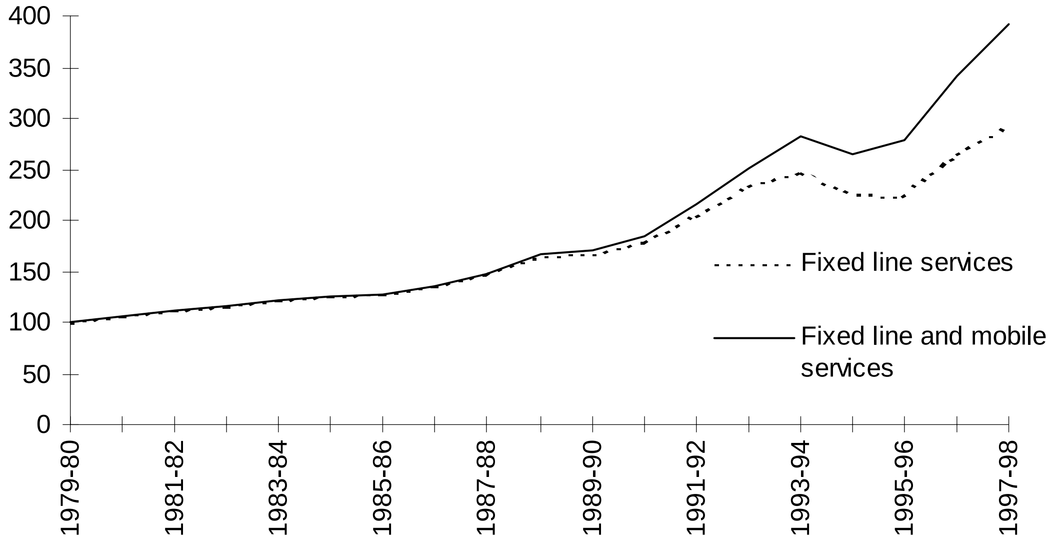
### *Total factor productivity*

There is evidence that Telstra's total factor productivity growth increased rapidly in the late 1980s until at least 1993–94. Data for later years are not available. The BIE (1995a) estimated that total factor productivity grew by an average of 6.3 per cent between 1979–80 and 1993–94. However, growth in total factor productivity in the early 1980s was low (4.7 per cent average from 1979–80 to 1985–86), but it accelerated from the mid-1980s (8.0 per cent average per annum from 1986–87 until 1993–94), with further acceleration from 1990–91 (average of 11.9 per cent per annum between 1990–91 and 1993–94). On the basis of the course of the partial measures, it would be surprising if this rapid growth has not continued.

## 10.4 Has productivity growth been passed on to users?

The CPI–X 'price-capping' regulation has operated since 1989. It is designed to force Telstra to pass on productivity improvements to users of telecommunications services. Telstra is allowed to increase the weighted average of its prices by a maximum of the movement in the consumer price index less a percentage, X. X is set so as to reflect total factor productivity growth. Abraham (1994) has analysed the theory of price-capping and applied it to the first two triennia of Australian experience.

Figure 10.1: **Fixed line and mobile telephone connections per full time employee, 1979–80 to 1997–98**
(indexes 1979–80=100)




*Sources*: Data for the period 1979–80 to 1990–91 are from Telecom annual reports. Data for 1991–92 to 1993–94 are from the Steering Committee on National Performance Monitoring of Government Trading Enterprises and Telstra annual reports. Data for 1994–95 to 1996–97 are from the 1996–97 Telstra Annual Report. The forecasts for 1997–98 are based on discussions in the Appendices to the Public Offer Document of the 1997 Telstra Share Offer.

The level of X has been increased at each review since the price capping was introduced. It was initially set at 4 per cent. It is now set at 7.5 per cent for the current triennium which ends at the conclusion of 1998. The Government has announced that the price-capping will continue in 1999–2001 and is currently investigating the appropriate level of X for that triennium.

There is evidence that the X has not been large enough in the past. The estimated total factor productivity growth in recent years has been around 8 per cent (see the previous section) and, while X has been increased, it has not yet reached this level. Accordingly, some productivity growth appears to have flowed through to excessively higher profits and maintenance of excessive costs rather than price reductions.

## 10.5 Efficiency gains from price 'rebalancing'

There are two broad problems with Australian telecommunications prices. First, overall they are 'too high' because the overall cost structure of telecommunications in Australia is unnecessarily high. Second, the prices of the various services are poorly structured relative to the cost level; some being too high and others too low relative to these costs. Key service prices remain too high because of divergences of prices from costs and because of excessive overall cost levels. The evidence on efficiency gains from past and possible restructuring (sometimes called 'rebalancing') of prices around *existing costs* is considered in this section. The impact of reducing the overall cost structure is considered in the next section.

Principles of efficient public utility pricing as applied in telecommunications are set out in AHD (1997, Chapter 4). These principles suggest three broad rules of efficient pricing:

- first, prices of services should generally be aligned to long-run marginal costs of providing them but with appropriate variations to reflect the different costs of meeting peak and off-peak loads;
- second, customer access charges should cover at least the full long-run cost of providing that access. The network externality argument no longer justifies pricing residential access below cost;
- third, where this pricing regime does not result in full cost recovery, unallocable costs should be covered by deviations of prices from long-run marginal costs, where the deviation is greater the more inelastic is the demand. Services with the more inelastic demands are especially business access and local calls (particularly business).

Prices of individual telecommunications services are influenced by price sub-caps, explicit price regulations, and competition (pockets of monopoly remain) as well as general and specific cost reductions. As set out in AHD (1997, Chapter 8) these influences have meant that:

- international call prices have fallen a lot since the late 1980s but are still well above costs of provision. The efficiency costs are large because of this large gap and the high elasticity of demand;
- long-distance prices have also fallen substantially over a long period but still represent an area where there is a large gap between price and long-run marginal cost. The efficiency cost from this is substantial;
- mobile and fixed-to-mobile call prices have been held too high. However, subscribers have benefited by being offered a menu of combinations of

access and call prices, so these high call prices have not prevented the attainment of a high level of penetration of mobile telephony in Australia;

- local call prices have fallen little and have remained poorly structured. A large gap between average price and long-run marginal cost is justifiable on the basis of the inelasticity of demand for local calls. However, the application of peak and off-peak pricing principles could result in substantial efficiency gains; and
- customer access prices have remained inefficiently low. Residential access prices do not cover the costs of providing access. Business access prices do cover costs but are still inefficiently low in the light of their highly inelastic demand.

Unnecessarily high prices for key telecommunications services like long-distance and mobiles act as a 'tax' on producers using them as inputs. These taxes impact differently on different industries depending on the importance of telecommunications inputs in their cost structure (ie their 'telecommunications intensities'). These taxes harm economic efficiency by reducing activities worth more than their cost of provision to the economy, and by distorting input choices.

They will be particularly harmful where they impact on exports traded on the 'small country' basis. In this case the costs cannot be passed on to buyers and result in a contraction of activity as the artificially high marginal cost impacts with a fixed price.

There have been studies of the efficiency gains from moving towards more efficient pricing structures (assuming the same excessive cost levels remain). One of these is contained in the AHD (Chapter 8 and Appendix C).[1] This study estimates the efficiency gains by service area; not industry or sector. Results are crucially dependent on own-price elasticities. (These are reviewed in Chapter 3 and Appendix A of that paper.) Our analysis indicates that there are substantial gains from different 'rebalancing' scenarios ranging from $340 million to $400 million in 1995–96. It must be emphasised that these gains result from rebalancing around the existing excessive cost level. Much larger gains are possible from reducing cost levels to international best-practice levels.

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[1] This study was similar in approach to, but more sophisticated than, that in Albon (1988). Some elements of this approach have been criticised by Quiggin (1996) and by my discussant, Henry Ergas.

## 10.6 CGE analysis of the effects of telecommunications productivity improvements

Productivity improvements in telecommunications lower the overall cost structure of producing telecommunications services, and to the extent that these get passed on (see section 10.4) it is in terms of price reductions to business and residential users. Some idea of the sectoral and economy-wide impacts of these overall price reductions flowing from microeconomic reform in telecommunications can be gained by using a computational general equilibrium (CGE) model.

### 10.6.1 Relevant features of CGE models

Three features of these CGE models are important in interpreting their results. First, unlike the pricing efficiency model of the previous section, these CGE models disaggregate by sector of the economy and not by telecommunications service. This makes it possible to allow for differences in telecommunications intensity across sectors.

Second, in their standard form, these models are generally not sufficiently disaggregated to model the impact of a non-uniform price change. Rather, such models examine the likely effects of a uniform price reduction. This means that they usually do not allow for the differences in impact on sectoral costs according to the pattern of actual price reductions and the pattern of use of telecommunications services.

Third, these models are also usually based on a Leontief fixed-coefficient production technology and do not capture efficiency gains from reducing distortions of input choice. Where prices do not reflect resource cost, producers are induced to use input mixes which minimise their own production costs but not the costs to the economy as a whole. Presenting producers with prices closer to costs will induce them to adopt input mixes with lower deadweight losses for given levels of output.

In principle, CGE models can be disaggregated and additional behavioural equations added to provide a more complete analysis of the effects of market interventions. Disaggregation and augmentation can be used in applied work to overcome the limitations of generalised models. In practice, data and other limitations often preclude the inclusion of the ideal set of industry, commodity and behavioural detail. Accordingly, applied CGE models are often used to indicate the broad direction of change from reform and the orders of magnitude of effects. For these reasons, emphasis is often placed on sectoral and economy-wide effects of change.

### 10.6.2 The Econtech model

One such modelling exercise was conducted by Econtech (1996) for the Department of Communications and the Arts in 1996. The model used was a mixed micro and macro model representing the evolution of the 'Murphy model' towards a more microeconomic focus.

The modelling exercise most consistent with the evidence of Telstra's deviation from best practice was an increase in labour productivity of 30 per cent and of capital productivity of 10 per cent. This converts through to a *general* price reduction in the price of telecommunications services of about 12 per cent after general-equilibrium adjustments — especially an increase in real wages.

The basic result of the modelling exercise is that the increase in productivity gives rise to an estimated $1.7 billion increase in annual real consumption, a measure of efficiency change. The biggest sectoral gains are in those areas using telecommunications services most intensively — communications, accommodation, and personal services (Tsolakis, Cook and McCutcheon 1996).

The most immediately desirable extension of the Econtech approach would be to disaggregate by telecommunications services as well as by sectors/industries, and to model explicitly the effects of distortions of input choice.[2]

## 10.7 Conclusion

In the 1980s, the telecommunications industry presented itself as a clear case in need of microeconomic reform. The sector was not performing sufficiently well to meet the requirements of producers using its services as inputs — especially in the light of the internationalisation of the economy — or of final consumers. The average level of prices was too high (broadly reflecting low productivity by international standards), prices were inefficiently structured and new services were delayed.

Microeconomic reform of the industry has been proceeding since the late 1980s. While it has contained bits of all the basic elements — corporatisation, greater competition and privatisation — the industry has been difficult for the government to manage. This flows from the continuing use of the industry to deliver political favours, entrenched union power (not treated explicitly in this paper) and the lack of a clear path to follow on some basic issues such as access pricing and funding of community service obligations (CSOs).

2 Boles de Boer and Evans (1996) measure the total factor productivity change for New Zealand Telecom and evaluate the efficiency effects of total factor productivity growth based on an aggregated telecommunications product.

In my view, the microeconomic reform process in telecommunications has been a clear success in that there is a marked acceleration of productivity growth from when reform began in the late 1980s, cost levels are moving closer to international best practice, prices have come down in general, prices are now more efficiently structured, and new technologies and services have become available more rapidly. There do not appear to be too many who would want to have gone through the last ten years with the old ‘Telecom monopoly’ structure intact. None the less, two of the three basic problems that stimulated the reform process are still only partially solved, and there is no room for complacency in a world where the benchmark is moving ahead as well as Australia’s performance.

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## Discussant — *Henry Ergas*

Let me say at the outset that I have not had an opportunity to read the paper for this session. As a result, my comments may not do it justice but I hope that they will nonetheless add to the debate. These comments are based on the Industry Commission's Staff Information Paper on *Telecommunications Economics and Policy Issues* (Albon, Hardin and Dee 1997). That paper covers a broad agenda — one far broader than I could comment on today. Rather, I want to structure my remarks around the paper's two central messages:

- first, that our telecommunications pricing is in a mess; and
- second, that public policy can and should fix that mess.

I will deal with each of these in turn.

### Pricing

Let me start by saying that I agree with the paper's broad conclusion that current telecommunications prices are seriously distorted. As the paper argues, fixed fees are too low and usage-related charges are too high. The result is to restrict demand and reduce welfare.

Having said that, it is my view that the paper does not get it quite right in its analysis of costs, of demand, and of efficient prices and hence may mis-state the welfare costs of the price distortions.

#### *Costs*

Let me turn first to costs, and notably to the implications for cost structures and levels of changes in telecommunications technology.

The paper has a rather old-fashioned description of the telecommunications network and how it works. As a result, it misses major network developments affecting the level, and even more importantly, the structure, of costs.

To understand these changes it is useful to start from the two major factors that now characterise demand for telecommunications services.

The first is that aggregate demand for bandwidth is growing extremely rapidly, largely as a result of the continued strong growth of data transmission. Given strong growth overall, it is sensible to increment the network in ever larger lumps — that is, the minimum efficient increment to capacity is now substantially greater than it was five or more years ago.

Second, while aggregate demand is increasing rapidly, the composition of that demand has become increasingly uncertain. This partly reflects the effect of competition. However, it also reflects industry-wide uncertainty about the way consumption patterns will evolve for the increasingly diverse range of services on offer.

As a result of this uncertainty, carriers are re-configuring their networks so as to provide for greater flexibility in traffic types. In signalling and control systems, deployment of the Intelligent Network Architecture, and the first moves towards standardisation of the Telecommunications Information Networking Architecture (TINA), provide a platform for simplifying the design and network-wide implementation of new services. In the transport and network layers, the shift to the synchronous digital hierarchy provides not only for greater, but also for more readily re-configured, bandwidth. So does the move towards the mesh topologies characteristic of the Internet Protocol in the short-term and to Asynchronous Transfer Mode (ATM) switching in the longer term. Finally, the Customer Access Network has been substantially redesigned, with the use of remote integrated multiplexor (RIM) and remote switching stage (RSS) technology pushing the first point of traffic concentration far closer to the customer premise.

Combined, these changes have far-reaching implications for network cost structures. Two of these implications are worth stressing:

- first, the marginal cost of traffic is decreasing, as a greater share of the cost of typical network elements is accounted for by their first-in cost; and
- second, taking the network as a whole, the share of common costs is rising rapidly, while the costs attributable to particular services are decreasing.

Now, although the paper aims to measure costs on a forward-looking basis, its cost modelling does not, in my view, capture these changes to any appreciable extent. The result is that incremental traffic costs are lower than the paper suggests, while common costs across traffic types are greater.

### *Demand*

I turn now to demand — the second side of the efficient pricing coin.

The paper presents a thorough and very useful review of the econometric literature on telecommunications demand modelling. Inevitably, that literature centres on demand for the relatively mature services, and notably on voice telephony. Moreover, much of it relies on observations drawn from periods when prices for these services were substantially higher than they are today.

These limitations of the literature are apparent in the paper’s demand analysis. Two points need to be made in this respect.

First, the demand elasticities used in the paper, notably for STD and IDD traffic, seem high when set against those now used in commercial practice. This may be due to price changes that have occurred since the estimation period in the studies the paper relies on.

Second, the new services, which the paper does not cover, are likely to have relatively elastic demand. The services at issue involve high-speed data transmission supporting applications such as transport of high fidelity audio and video content, information retrieval and large-scale file transfer. These services have very substantial bandwidth requirements; at current prices for bandwidth they are only marginally attractive; they are most likely to grow and attain critical mass at prices substantially lower than those now current.

### *Prices*

Together, costs and demands should determine efficient prices, and hence allow assessment of the extent and impact of current distortions.

The paper is right to argue that fixed charges should be higher and usage-related charges substantially lower. Having said that, three points need to be made.

First, it is not certain that — even in the absence of network externalities — efficient pricing would load the entirety of non-traffic sensitive costs onto fixed fees. This is for two reasons:

- an important share of non-traffic sensitive costs is not attributable to individual lines or channels. As a result, these costs should be recovered in line with willingness to pay. Traffic-related charges may help provide for effective price discrimination in this regard; and
- the line-related component of non-traffic sensitive costs is largely sunk. The assets at issue, in other words, are largely specific to the individual user and have little scope to be redeployed to other uses. This creates scope for opportunistic conduct both by the acquirers and by the suppliers of new lines. The contract which deters such conduct, or limits it to efficient levels, is likely to involve some risk-sharing between the parties. Charging for some part of non-traffic sensitive costs through traffic-related charges is one way of achieving this objective.

Second, efficient prices for traffic-related services are likely to be far less uniform than the paper suggests. Given the structure of costs outlined above, traffic-related charges at the margin of consumption should be close to zero. Even approximating this in practice requires extensive price discrimination effected through complex, multi-part pricing arrangements. The paper's emphasis on estimating uniform Ramsey prices seems at odds both with theory and with the emerging commercial reality.

Third, it is likely that it is in the new services that prices are furthest from their efficient levels. These prices are high so as to avoid arbitrage — that is, the transfer of relatively profitable telephony traffic onto data circuits. By requiring usage prices for telephony to be kept high, the current regulatory arrangements thereby stifle demand for the very services the Government claims it is keen to promote.

### *Efficiency costs*

Because of the points made above, it is my view that the paper somewhat understates the efficiency costs arising from the current pricing structures.

As regards telephony, the paper estimates these losses on the basis of price elasticities which may be too high. However, this error is more than offset by the fact that the paper's estimates of marginal costs are too high; and by the fact that the paper compares its estimates of marginal costs to uniform prices, rather than comparing them to the efficient non-uniform price schedule.

Second and probably even more important, the paper overlooks the substantial welfare costs associated with distortions to the pricing of services other than telephony. Particularly where the price distortions prevent or slow the development of entirely new services, as could well be the case in the area of multi-media, their welfare costs could be very substantial indeed.

In short, by discouraging innovation, the current price structure is likely to cause efficiency losses greater than can be captured by analysing telephony demand alone. By focussing solely on telephony, the paper weakens the case for comprehensive change.

## The policy prescription

I turn now to the paper's recommendations for public policy. These can be summarised in two propositions:

- first, that the current controls on retail prices should be removed, so as to allow prices to be placed on a more efficient basis; and
- second, that measures should be taken to make competition in the supply of telecommunications services more effective, thus also protecting consumers from any adverse consequences that might flow from the removal of retail price constraints.

I have no quarrel with these propositions, which strike me as eminently sensible. However, the devil is in the detail, and I do have serious concerns about specific measures the paper recommends. The measures at issue are those which, according to the paper, would promote more effective competition.

In essence, the paper suggests that the Government should either divest the local loop service into a separate entity or, if it decides to retain Telstra as an integrated entity, submit it to stringent regulation over the conditions of access and possibly, its market conduct.

I am not convinced that these proposals have been carefully thought through.

Let me start with the divestiture option. The paper claims that there is no evidence of economies of scope; what it means by this is that it has not found econometric studies evidencing these economies. The claim that such studies do not exist is not entirely accurate; but even if it were accurate, it would not be very surprising. The fact of the matter is that economies of scope arise from transactions costs, and that it is difficult, if not impossible, to capture these costs quantitatively. However, even a cursory examination of recent trends in the technology would have pointed to very substantial scope economies — for example, as between local and long-distance switching.

In addition to mis-stating the evidence on scope economies, the paper also overlooks the other costs that divestiture would involve. It is, in particular, increasingly difficult to draw a meaningful boundary line around local transport and switching, thereby distinguishing it sharply from other services. As a result, attempts to limit carriers to providing local service come under ever greater pressure as the restricted entities test the scope of their operating license. In the United States, for example, the years subsequent to the divestiture of AT&T have seen an accumulating mass of court proceedings, as the boundaries between ‘local’ and ‘non-local’ service are brought into question. Enforcing the kind of restriction the paper suggests would therefore involve substantial, on-going regulatory intervention, creating vast scope for rent-seeking behaviour by incumbents, competitors and regulators alike.

Turning to the second issue, what the paper proposes is essentially more of the same — that is, a continuation of the intrusive, industry-specific regulation we have had since 1991. Now, it is difficult to disagree with the proposition that regulation, were it efficient, would yield desirable economic outcomes. Indeed, that proposition is merely a tautology. The issue, however, is whether the kind of regulation the paper proposes is likely, in practice, to be efficient — that is, whether it is likely to make matters better rather than worse.

This, to my mind, is an empirical question, and one which the paper could have addressed on the basis of the experience to date. That experience highlights the dangers involved in bringing commercial decisions into the political domain.

Thus, looking at what has happened since 1991, I am struck at the range of decisions which appear sharply at odds with economic efficiency.

At a policy level, decisions were taken which sought to lock in particular technologies, and carve up the field among competing players. The advanced mobile phone system (AMPS) phase-out decisions are well-known and require no further comment. However, the decision to grant Optus a monopoly over the satellite service may have been even more costly. That decision effectively precluded Telstra from providing Pay TV over a satellite-based service, ultimately leading (together with a raft of other interventionist measures) to the duplicative cabling of the nation's streets.

The decisions taken by the regulatory authority seem no more enlightened. AUSTEL repeatedly acted to prevent Telstra from discounting, thereby virtually eliminating price competition from the Australian market. At times, it went even further down this path — at one point, for example, seeking to force Telstra to increase charges for call messaging to a level many times above costs so as to protect and preserve competing, clearly inefficient, suppliers of call messaging services.

These policy errors reflect an environment in which pricing and other decisions are taken not on the basis of commercial merit but under the weight of interest groups and organised rent seekers. It is not easy to see how sensible economic outcomes can be achieved in this environment; it is therefore puzzling that the paper should call for it to be perpetuated.

These issues involve the broad architecture of the regime. There are also, however, a number of comments which could be made about the specific actions the paper proposes. Allow me to merely focus on one — the pricing of interconnection.

The paper's discussion of this issue struck me as rather sparse. There is, for example, no real assessment of the economics of price discrimination in access and there is a strong, in my view erroneous, presumption in favour of uniform pricing of access services. At the same time, the conclusions the paper comes to about access pricing are not clearly substantiated.

Consider, for example, the paper's treatment of the access deficit — that is, the difference between non-traffic sensitive revenues and non-traffic sensitive costs. The paper proposes that this deficit — which arises from regulatory constraints over prices — should not be included in the cost pool for the setting of access charges (that is, of the charges Telstra can impose on competitor's use of its local network). This obviously means that Telstra would have to bear this deficit itself, while its competitors did not. In turn, this means that Telstra's revenue requirement from traffic, and hence the prices it could set for traffic, would be greater than say, Optus. As a result, Optus could secure market share even though its resource costs were higher than Telstra's in carrying that traffic.

Now, as we all say so frequently, rectangles are larger than triangles, and when market demand elasticities are low, as they are for the services at issue, this is even more likely to be the case. As a result, this proposal, taken alone, could readily impose welfare costs which outweighed any welfare gains from price re-balancing. Yet the paper does not mention these costs, let alone attempt to quantify them.

These are areas where the authors really should, in my view, think again.

## Conclusions

Overall, the paper makes a useful contribution, notably in pointing to the need to bring prices more closely into line with costs. However, the details of that analysis could be strengthened in ways which would make the conclusion the paper draws more robust and compelling. The discussion of policy options is, perhaps inevitably, more controversial. The New Zealand approach deserves more serious consideration. It certainly seems odd that those keen on liberalisation in general should advocate perpetuating regulatory arrangements which are both strikingly illiberal and far from economically efficient.

## Reference

Albon, R. P., Hardin, A., and Dee, P. 1997, *Telecommunications Economics and Policy Issues*, Industry Commission Staff Information Paper, AGPS, Canberra, March.

## **Discussant** — *Graeme Woodbridge*[3]

In his paper, Robert Albon analyses two questions relevant to productivity improvements in the Australian telecommunications industry.

First, he asks the question, what are the improvements in productivity or welfare (allocative efficiency) that can be achieved by:

- allowing retail prices of telecommunications services to be more closely aligned with costs? and
- allowing common costs associated with the provision of telecommunications services to be more efficiently recovered (by allowing differential retail prices for services based on the sensitivity of demand to price)?

The answer to this question is that the gains are likely to be large.

Second, he asks what has been the recent record of productivity growth (measured as outputs per unit of inputs) in the Australian telecommunications industry? The answer to this question is that there has been an acceleration of productivity growth since the deregulation of the Australian telecommunications industry which commenced in 1988.

Central to both of these questions is the role competition can play in encouraging improvements in productivity. Competition and the resultant disciplines it places on suppliers, is likely to push prices toward costs and encourage service providers to offer services of most value to consumers. Competition also encourages suppliers to reduce costs and to maximise the quality and quantity of services provided given the inputs used. It is also the most effective way of encouraging innovation and efficient investment which is particularly important in an industry with rapid improvements in technology, such as telecommunications.

A large number of countries, including Australia, are in the process of removing barriers to competition to create an environment for productivity growth in telecommunications. This process is complicated by a number of factors including the existence of retail price controls and the market power of incumbent providers. This market power, at least partially results from the incumbent's control over access to essential services provided by telecommunications infrastructure by competitors. One of the cornerstones of the access regime in telecommunications in Australia is to promote competition

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[3] Graeme Woodbridge is a member of the staff of the Australian Competition and Consumer Commission (ACCC). Any views expressed in this commentary do not necessarily represent the views of the ACCC.

in the provision of telecommunications services that are dependent upon the services provided by telecommunications infrastructure.

## Retail price controls

Controls on the retail prices of telecommunications services are currently in place in many countries. The aims of these controls are usually to constrain the retail prices of providers of telecommunications services with market power and to ensure that basic telecommunications services are widely available at 'fair' prices. As indicated in Robert Albon's paper, retail price controls often tend to result in cross-subsidies from:

- urban to rural customers;
- business to residential customers; and
- long-distance calls to local calls.

As indicated in the paper, these cross-subsidies lead to welfare losses. Productivity (allocative efficiency) could be improved if retail prices were more aligned with costs. However, just as importantly for productivity growth are the implications of retail price controls for the development of competition.[4] Competition is likely to develop in markets where the differences between prices and costs are the greatest. Entry will be attracted in the markets where there are excess profits (eg business markets). Entry is less likely in markets where the margins between retail prices and costs are smaller.

So, in addition to the welfare losses indicated in the paper, productivity growth in some rural, residential and local call markets may not be as large as otherwise if competition cannot fully develop as a result of retail price controls.

However, it is also recognised in many countries that retail price controls are designed to deliver outcomes, including the availability of basic telecommunications services to all users at 'fair' prices. An important policy question is therefore how can competition develop given the existence of retail price controls? Countries have largely addressed this through universal service schemes.

### *Universal service schemes*

Universal service schemes provide funds to compensate service providers who provide services in markets where the costs of provision exceed the controlled retail price. This allows the provider of the service in these markets to recover costs, while maintaining the objectives of the retail price controls. Further, if

4 See Crandall (1997) for a useful discussion of the issues.

once the size of the fund is decided, the allocation of the funds is competitive, competition can develop and productivity improvements can be encouraged in these markets.

The practical difficulties experienced with universal service schemes are identifying the markets where the fund applies, and determining the size of the fund for each market. If the coverage of the universal service scheme is incomplete (and does not compensates the provider in non-profitable markets) there is the potential for inefficient entry in profitable markets. If the most efficient provider is required to provide universal service (without appropriate compensation), there is the possibility of it being handicapped in competing in more profitable markets (even if it is the most efficient provider).

### *Access pricing*

A second important policy issue faced in countries that have retail price controls is the relationship between these controls and access prices. In order to encourage the development of competition in the provision of telecommunications services, many countries, including Australia, have established access regimes. Competition in the provision of telecommunications services depends upon the use of other providers' telecommunications networks. Without access to these networks (eg the telephone line to the consumer), competing providers have little opportunity to offer competing services. Often these providers are competing against the provider of these bottleneck inputs.

Regulators have taken two approaches to pricing access to bottleneck inputs in telecommunications.

### *Cost-based approaches to pricing*

In this approach, the price of access is usually based on the costs of the network elements used to provide the service. If the retail price controls are not based on cost and if there is not a comprehensive universal service scheme, there may be some markets where the difference between the access price and the retail price is so small that entry and competition will be unlikely. In other markets, there will be a significant difference and competition will flourish. Further, cost-based pricing will ultimately put pressure on the retail price controls unless a comprehensive universal service scheme is in place.

### *Demand-based approaches to pricing*

Demand-based prices use the existing retail price structure as the starting point and deduct avoided costs to reach the access price. In terms of encouraging competition in all markets, this approach has an advantage over cost-based approaches. If the avoided costs are accurately measured it provides scope for efficient firms to enter and compete in all markets. The disadvantage of this approach is that it can entrench the existing retail price structure and the welfare losses mentioned in the paper.

## Conclusion

There are many elements of productivity. The paper points to a number of these elements and examines the implications of current retail price controls in Australia for allocative efficiency. This provides useful insights of the effects of retail price controls on productivity and welfare. An associated policy issue is the scope for competition to develop in all markets given retail price controls. Given the role competition can play in encouraging improvements in productivity, it is important that policies are designed to ensure competition can develop in as many markets as possible.

## Reference

Crandall, R. 1997, *Are We Deregulating Telephone Services? THINK AGAIN*, Brookings Policy Brief No. 13, Brookings Institution, Washington DC.

## General discussion[5]

In reference to Henry Ergas' observation that price elasticities had fallen since the early 1980s, one participant queried the source of this information. In response, Robert Albon advised that elasticity estimates were publicly available to the late 1980s. However, it has become far more complicated to obtain elasticity estimates since Australia has moved away from a monopolised industry to a situation with competing carriers. More recent information with which to estimate elasticities is not generally available.

5 Due to timing considerations at the workshop, the discussion of this important topic was short.

# 11 EFFECTS OF THE LABOUR MARKET ON MICROECONOMIC REFORM IN AUSTRALIA

*Judith Sloan*

## 11.1 Introduction

This paper deals with the link between microeconomic reform and labour market reform in Australia. Arguably, labour market reform is simply a sub-set of the range of supply side changes which fit into the broader term — microeconomic reform. Labour market reform, however, is often singled out for particular attention not only because the labour market is viewed as 'special' but also because reform of labour market arrangements is often very difficult to effect. The 'specialness' of the labour market is generally thought to derive from the fact that workers are human beings, but more particularly, from the fact that labour productivity is endogenous and costly to monitor. Therefore, work environments which can induce 'consummate cooperation' on the part of workers rather than 'perfunctory performance' may well be economically efficient when the endogeneity of labour productivity is taken into account (Sloan and Wooden 1984). The second aspect — the difficulty of achieving change — derives from the first and also relates to the complicated set of institutional arrangements which typically govern labour market transactions and relationships.

It is important to define what is meant by labour market reform in this context. Or to put the issue in a slightly different way, what are the types of labour market rules and regulations which impact on the interaction of supply and demand in the labour market? The answer to this question is lengthy and extends well beyond industrial relations regulations. The list includes: rules and regulations related to training; anti-discrimination laws; employment protection laws; occupational health and safety regulations; adherence to international labour standards; and welfare payment arrangements, *inter alia*. In this paper, however, we concentrate on issues traditionally described as industrial relations issues — rules related to collectivism and agreement making, union security, and sanctions against industrial action.

The structure of this paper is as follows. In the next section, we consider the direction of effect between labour market reform and microeconomic reform. Having noted the lag between economic change and institutional reform, we outline the major changes to the regulatory environment in industrial relations over the past decade or so. In particular, we consider the shift towards agreement-making, away from an award-based system; the role of award simplification; the role of the Australian Industrial Relations Commission (AIRC); and the sanctions against illegal industrial action. We then present the evidence on agreement-making, assess the progress of award simplification and the sanctions against illegal industrial action. A conclusion completes the paper, which also includes an agenda for future research.

## 11.2 The link between labour market reform and microeconomic reform

The link between labour market reform and microeconomic reform can be thought of as running in two directions — labour market reform leading to specific microeconomic changes and microeconomic reform leading to labour market reform. This paper considers principally the first direction of effect. This emphasis is neither intended to downplay the role played by microeconomic reform leading to labour market changes, which in practical terms is the most likely sequence, nor to ignore the labour market consequences of microeconomic reform, a topic covered by Jeff Borland in this volume.

In reality, labour market reform is one element of the series of supply side reforms which have been a package of reforms implemented in Australia over the past decade or so. Key among these reforms has been the reduction in product market protection, heightening the competitive pressures faced by many enterprises, which has in turn created an environment for other supply-side changes. As Sloan (1994, p. 22) has noted, ‘Australia is not alone in procrastinating on labour market reforms’.

While the focus of this paper is on regulatory change, the process of change in the labour market can occur in the absence of institutional change or despite hostile institutional change. In Australia (and elsewhere), for example, there have been some well-publicised cases of transformed workplace arrangements prior to any significant institutional reforms. These changes took place in enterprises confronted by greater competitive pressures and where commercial survival was threatened (BCA 1988). In other words, some enterprises, under pressure, were able to secure significant changes to the nature of the employment relationship between workers and managers notwithstanding an unchanged, and arguably hostile, regulatory environment. By the same token, in the context of altered institutional arrangements, not all enterprises will seek to transform labour market arrangements.

## 11.3 Key institutional developments

In terms of dating key institutional developments in the Australian labour market, it is appropriate to identify 1987 as a significant year. In this year, the Conciliation and Arbitration Commission introduced the so-called Second Tier into wage fixing which signalled a break from the past. A form of productivity bargaining in which workplace changes which could be demonstrated to be cost-neutral, the Second Tier delivered a fixed rate of increase to workers, set at 4 per cent. The importance of this development stems from the partial decentralisation, albeit controlled, of wage fixing. By contrast with some short periods of patchy collective bargaining in the early 1970s and early 1980s, the Second Tier experiment ushered in a long period of decentralisation of wage fixation.

The introduction in 1987 of legislation in Queensland providing for so-called Voluntary Employment Agreements was another significant step in the reform of industrial relations, with state governments prepared to deviate in their approach to industrial relations regulation from the approach being followed by the federal government. Other examples of independent regulatory reforms undertaken by State governments, albeit often to little practical effect, included the *Industrial Relations Act 1991* (NSW), the *Employee Relations Act 1993* (Victoria) and the *Workplace Agreements Act 1993* (WA).

As far as federal developments are concerned, the introduction of the Structural Efficiency Principle in 1988, leading to the process of award restructuring; the provision for enterprise collective agreements under Sections 112 and 115 of the *Industrial Relations Act 1988* (Commonwealth); and the introduction of the Enterprise Bargaining Principle in 1991 were all key in terms of progressing the pace of labour market reform, albeit relatively slowly.

Following the election of the Coalition as the federal government in 1996, there was a general expectation that more dramatic labour market reform would occur. The *Workplace Relations Act 1996* was passed in late 1996, with the provisions coming into effect in early 1997. Falling well short of a radical deregulation of labour market institutions, the key features of the *Workplace Relations Act (WRA)1996* are as follows:

- a reduced role for awards, including the simplification of awards;
- a reduced and different role for the Australian Industrial Relations Commission;
- choice of agreement streams, including non-union collective agreements and individual contracts (the latter termed, Australian Workplace Agreements (AWAs)); and

- more effective sanctions against illegal industrial action, the latter including secondary boycott action.

Arguably one of the potentially more important innovations of the *WRA 1996* compared with previous legislation is contained in Schedule 5 – Awards. Section 88A states, *inter alia*, ‘awards are simplified and suited to the efficient performance of work according to the needs of particular workplaces or enterprises’ and ‘the AIRC’s functions and powers in relation to making and varying awards are performed and exercised in a way that encourages the making of agreements between employers and employees at the workplace or enterprise level’. To achieve these objects, the *WRA 1996* limits the power of the AIRC to arbitrate, and to make or vary awards, to some twenty allowable award matters (Section 89A(2)). It should be noted, however, that the AIRC may include in an award ‘provisions that are incidental ... and necessary for the effective operation of the award’ (Section 89A(6)) as well as ‘exceptional matters’ in order to settle an industrial dispute (and where there is no reasonable prospect of agreement) (Section 89A(7)).

In theory, award simplification offers the opportunity for non-allowable matters to be deleted from awards and for awards to become simple and less prescriptive. By the same token, there is discretion for the AIRC to interpret what is and what is not an ‘allowable matter’, as well as to decide on any matter which is to be regarded as ‘incidental’ or ‘exceptional’.

The *WRA 1996* makes a number of important changes to agreement making and agreement certification procedures. In simple terms, there are three main types of agreements from which parties can choose — collective union agreements, collective non-union agreements and AWAs. In the two former cases, agreements are required to be certified by the AIRC subject to the ‘no disadvantage’ test which latter means that workers cannot be made worse off in total compared with the conditions provided for under the relevant award. AWAs, by contrast, are vetted by a new agency, the Office of the Employment Advocate, but are also subject to the no disadvantage test. AWAs only apply to those workers who actually sign the agreement — they are individual contracts although identical contracts may be signed by some or all workers in an enterprise. Where the Employment Advocate is uncertain as to whether the no disadvantage test has been satisfied, an AWA may be sent to the AIRC for approval or rejection.

While the *WRA 1996* provides for a clear right-to-strike during the negotiation phase of agreement-making, unprotected industrial action can be the subject of injunctive relief and possible damages action (see Schedule 14). Under Section 127 of the *WRA 1996*, parties can apply to the AIRC for a certificate to apply to the relevant court for an injunction ordering the cessation of unprotected industrial action and to seek damages for economic harm. In addition, the Coalition government re-inserted the secondary boycott provisions in the *Trade Practices Act 1974*, providing injunctive and damages relief for industrial action falling into the category of secondary action.

There are a number of other features of the *WRA 1996* which also bear on the discussion of labour market reform. These include, in particular, the provisions dealing with freedom of association and unfair dismissals. The former in effect makes closed shop arrangements more difficult, although not impossible, as well as restricting unions' right of entry to workplaces in order to recruit and communicate with potential members. The latter provisions water down the unfair dismissal provisions of the previous legislation by insisting that emphasis be placed on the substantive reasons for dismissals over the procedural aspects and by providing for the AIRC to handle complaints in the first instance, including by way of arbitration.

Notwithstanding the greater role conferred on the AIRC by the *WRA 1996* in respect of the handling of unfair dismissal matters, the Act significantly reduces the role of the AIRC in respect of settling industrial disputes, often paper ones, by arbitration. Unless the AIRC can satisfy itself that there are grounds for terminating a bargaining period and then settling a dispute by arbitration — likely to be a rare occurrence — then the role of the AIRC is quite restricted in this area. Increasingly, the AIRC would appear to be most important in its role of establishing a safety net of wages and conditions for low-wage workers, adjustment of which has now occurred on two occasions since the enactment of the *WRA 1996*. Of course, from an economic point of view, this role is by no means trivial and can exert considerable influence on employment outcomes of low-paid and award-dependent employees.

To sum up these changes, the *WRA 1996* represents another development on the continuum of institutional labour market reform in Australian that can be dated to the mid 1980s. The key changes of the *WRA 1996* are: greater scope for and choice of agreements; a reduced role for (simplified) awards; a reduced role for the AIRC, in particular in terms of settling industrial disputes by arbitration; stronger sanctions against unprotected industrial action; weaker employment protection provisions; and greater freedom of association.

## 11.4 A stocktake of labour market reform

There are a number of means of measuring the progress to date of labour market reform in Australia. By the same token, it is important not to overstate the degree of change, a point underscored by the figures outlined in Table 11.1 below. These figures are the authors best-guesses of the coverage of forms of labour market regulation in the mid 1990s. According to these figures, just over one-third of employees remain covered by awards only, highlighting the continuity of past arrangements in the Australian labour market. Some 30 per cent of employees are covered by awards and registered agreements, whereas only 5 per cent are covered by registered agreements only. In other words, for those workers whose employment is principally regulated by agreements, this regulation is achieved in conjunction with awards. A final 30 per cent of employees are covered by informal and/or individual based arrangements and largely fall outside the regulated segment of the labour market. Most managers and many professional workers fall into this last category.

Table 11.1: **Forms of labour market regulation in Australia**

| *Type of labour regulation* | *Percentage of employees covered* |
|---|---|
| Awards only | 35 |
| Awards and registered agreements | 30 |
| Registered agreements only | 5 |
| Informal arrangements/individual contracts | 30 |

*Source*: Buchanan *et al.* (1997).

By the same token, the growth of workers covered by formal agreements, particularly in the federal sphere, has been very rapid, particularly since 1994. According to Hawke and Wooden (1997), between October 1991 and the end of 1996, over 10,000 federal agreements were certified and the number of employees covered by these agreements reached 1.74 million by September 1996, or nearly two-thirds of federal award employees. ‘The shift towards decentralised bargaining arrangements would thus appear, at least on the surface, to be impressive’ (Hawke and Wooden 1997, p. 4).

To describe the numerical significance of enterprise agreements does not necessarily convey anything about the impact of these agreements. Indeed, Hawke and Wooden (1997) note that some agreements deal only with a relatively narrow range of topics and are designed to be read in conjunction with awards. In Table 11.2, we present evidence of managers’ perceived impact of collective enterprise agreements. Interestingly, the perception of these managers is relatively positive in terms of the impact of the agreements. No managers perceived agreements leading to worse labour productivity while a clear majority thought that labour productivity had increased a little or a lot. One half of managers thought that output quality had increased and 47 per cent though profitability had increased. Overall, this evidence suggests a fairly positive evaluation of the outcomes of enterprise agreements, certainly in terms of the perceptions of the managers.

Table 11.2: **Effects of enterprise agreements on workplace outcomes**

| | *Decreased a lot* | *Decreased a little* | *No change* | *Increased a little* | *Increased a lot* |
|---|---|---|---|---|---|
| Labour productivity | 0 | 0 | 38 | 49 | 13 |
| Profitability | 2 | 9 | 42 | 38 | 9 |
| Output quality | 0 | 0 | 50 | 41 | 9 |
| Absenteeism | 5 | 12 | 70 | 10 | 2 |
| Employee skills | 0 | 3 | 52 | 36 | 9 |

*Source*: DIR (1997)

In Table 11.3, we provide figures for five broad industry groups on unionisation, federal agreement coverage and the overall distribution of employees by industry sector. The figures are for 1996. What these figures indicate is that there is a relatively disproportionate coverage by agreements of employees in Manufacturing. There is a less than disproportionate coverage of employees in Agriculture (although the overall numbers are very small) and in construction. The federal agreement coverage of employees in Mining and Services is broadly in line with employee numbers. The relative concentration of agreement coverage of employees in manufacturing is consistent with the relatively high unionisation in the sector and larger than average enterprise size in the sector.

In terms of the uptake of AWAs, it should be noted that AWAs were not available until the middle of March 1997. At the end of 1997, some 7,500 AWAs had been lodged, covering some 360 employers (Hawke and Wooden 1998). Figures since that date indicate an accelerating trend in the uptake of AWAs. Of course, in relation to the overall number of employees in Australia, the numbers of workers covered by AWAs are trivial. However, given that the number of non-union collective agreements achieved under the previous legislation was only 156 in total (DIR 1996), it can be concluded that the AWA provisions are relatively permissive in terms of providing for individual contracting for those parties who wish to do so formally. The overall impact on labour market arrangements is likely to remain marginal.

Table 11.3: **Labour intensity, union membership, agreement coverage and employment distribution, by industry sector, 1996**

| | *Unionisation* | *Federal agreement coverage* | *Distribution of employees* |
|---|---|---|---|
| Agriculture | 6.6 | 0.4 | 2.2 |
| Mining | 38.5 | 1.1 | 1.2 |
| Manufacturing | 38.7 | 19.5 | 15.1 |
| Construction | 29.7 | 2.3 | 5.1 |
| Services | 30.3 | 76.7 | 76.4 |
| **Total** | **31.1** | **100.0** | **100.0** |

*Source*: Wooden (1998)

What can be said of the effectiveness of the dispute settlement orders (Section 127) under the Act? The experience of the applications under Section 127 has been mixed. Between January and October 1997, there were 164 applications made under Section 127. Of these, in only 23 cases were orders issued to the parties to cease industrial action, three of which were subsequently revoked. A further 118 applications were withdrawn, presumably in most cases, because the industrial action had ceased (Hawke and Wooden 1998). There have been criticisms both of the delays of the AIRC dealing with Section 127 applications and the delays of the relevant Courts dealing with the orders. A case in point relates to a dispute affecting the construction of an oil refinery at Altona, Victoria. There has also been some ambiguity about the definition of industrial action; peaceful picketing has been ruled to be outside the purview of Section 127, for instance.

Finally on award simplification, a key case decision was handed down by the AIRC in December of 1997, using the Hospitality Industry Award as the test case (AIRC 1997). The issue of penalty rates had been specifically excluded from the case. The decision is a relatively complicated one and it is hard to square the definition of allowable matters and the resulting award as consistent with the term ‘simplification’. Many of the non-allowable matters are relatively trivial, whereas the inclusion of others as allowable suggest that the AIRC is likely, on balance, to take a relatively expansive view of allowable matters. This is before consideration is given to the inclusion of ‘incidental’ or ‘exceptional’ matters. At this stage, it would seem likely that some changes to awards will be achieved as a result of Section 89A but that the changes will neither be radical nor dramatic. The award system, in all likelihood, will continue to regulate a not insignificant proportion of employees' terms and conditions of employment into the future, particularly when the overall coverage of employees by agreements and awards is taken into account.

## 11.5 Conclusion

This paper focused on the link between labour market reform and microeconomic reform. It has concentrated on recent institutional changes in Australia and has provided some assessment of the progress of various labour market reforms. The point is made that the connection between labour market reform and microeconomic reform is two-way, with changes in the labour market arrangements having repercussions on other supply side features of the economy, and vice-versa.

The point is made that the relationship between institutional change and actual behaviour is not always evident. The example is given of enterprises transforming industrial relations arrangements in the absence of regulatory change, and sometimes despite regulatory change. By the same token, quite radical regulatory change can be associated with significant proportions of enterprises sticking essentially with the *status quo*, a point underscored by the figures provided in Table 11.1.

There has been a continuum of institutional reform affecting industrial relations in Australia since 1987, the year of an important break in the regulatory arrangements, being the year in which partial (and managed) decentralisation of wage fixing was introduced via the so-called Second Tier. In this paper, we concentrate on the changes made under the *Workplace Relations Act 1996*, including: the changed role of awards, the greater scope for and choice of agreements, the reduced role of the Australian Industrial Relations Commission and the sanctions against illegal industrial action. Mention is also made of the provisions dealing with freedom of association and unfair dismissals, respectively. On balance, it is argued that the new regulatory environment amounts to a differently regulated, less centralised system where the power of the trade unions is undercut by a number of provisions in the Act. This said, there are many features of continuity in the system and the fate of some of the provisions — for example, in relation to award simplification and sanctions against industrial action — are unclear.

In terms of the evidence, there has been a surprisingly strong uptake of agreements, although the numbers of individual agreements (Australian Workplace Agreements) is still very small. Managers appear to be favourably disposed to agreements, with generally positive results reported. The coverage of agreements is concentrated in Manufacturing and Services, with less than proportionate coverage in Construction and Agriculture. The uptake of AWAs has been small relative to the overall number of employees, yet much stronger than the uptake of the non-union collective agreement provisions under the previous legislation. The AWA provisions can be expected to have an impact at the margin.

As far as award simplification is concerned, the best guess is that awards will be slightly simplified over time through the deletion of non-allowable matters but that the overall impact on the comprehensiveness (and indeed prescriptiveness) of awards will again be marginal. The evidence to date on the sanctions against illegal industrial action is mixed, suggesting that Section 127 is having an uncertain impact.

What we can conclude with some certainty is that the regulatory arrangements are likely to be changed again and that there is still an unfinished agenda in terms of dismantling the workings of the system of compulsory arbitration. The system remains highly regulated — it is not clear that the *WRA 1996* ushered in a less regulated system overall — and the direction of change in the future is likely to involve less regulation of the employment relationship. There may be some to'ing and fro'ing, however, before this final position is achieved.

In terms of an agenda for future research, the following areas are suggested as being particularly fruitful:

- mapping and explaining current agreement and award arrangements;
- understanding work arrangement through detailed, comparative case studies;
- adopting a holistic approach to understanding employment relationships, including attention to the issue of management quality; and
- quantitative research linking workplace/corporate characteristics/outcomes and management attitudes, on the one hand, and workforce characteristics, on the other.

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## **Discussant** - *Tom Karmel*[1]

Following the overview given by Judith Sloan, I thought it would be useful to focus on the implications of labour market deregulation on a specific industry. The sector I will discuss is a service industry with a very large public sector component. It could be education, health, prisons, or community services, but the one that I have decided to look at is higher education, for the reason that I know something about it.

First, a little bit of history. The Conciliation and Arbitration Commission was reconstituted as the Australian Industrial Relations Commission in 1989. Specialised tribunals, such as the Academic Salaries Tribunal were incorporated in the new commission. Typically wage cases were brought to the tribunal and the resulting wage rises flowed directly into university funding through supplementation by the government — that is, the decisions by the commission had little, if no financial impact on universities. During the 1990s, this system has been transformed into one of enterprise bargaining.

Universities, at least according to the Australian Higher Education Industry Association (AHEIA), support the notion that enterprise bargaining should be conducive to successful negotiations over productivity and efficiency.

Enterprise bargaining was really quite foreign to the university culture. I think it is fair to say that it has been a real learning experience for both the management and unions. There have been some ugly industrial actions including strikes and pickets. However, the impact of industrial action on universities is by no means straightforward since the outputs are rather difficult to measure. Certainly there is no imperative to provide a return on shareholder funds, and bans on teaching or marking exam papers seem to have been a nuisance value more than anything else. There has also been a view that the central role of national unions has made bargaining focusing on individual work places rather difficult.

The impact of enterprise bargaining on universities is dependent on the funding structure of the sector. There are three important features to note:

- first, the sector is largely dependent on funds from the federal government (Figure 11.D1);
- second, government spending is being tightly controlled. Although there has been large growth in government funds going to the sector over the early nineties (Figure 11.D2), it is quite clear that that trend has ended, for

[1] The views expressed in this comment are mine and should not be taken to reflect those of my employer, The Department of Employment, Education, Training and Youth Affairs (DEETYA).

the time being at least. In general, governments are trying to cut back on expenditure and the higher education sector has not been excepted. In addition, indexation arrangements for the sector do not compensate universities for wage rises on either a higher education sector basis or, indeed, a community average basis (75 per cent of operating grants, taken to represent the wages component, are indexed by the safety net adjustment while 25 per cent are indexed by the Treasury's measure of underlying inflation); and

- third, there are controls on the way in which universities can operate. For the core of a university's business — government funded undergraduate teaching of Australian residents — we have:
  - fixed quantities of production (universities must meet student load targets); and
- fixed prices (funding per student for government funded places is fixed by the government and universities are not allowed to charge additional tuition fees to these students).

By contrast universities have considerable freedom to generate revenue from other sources:

- universities can charge fees for its postgraduates;
- universities can take overseas students and charge fees;
- universities can take fee paying Australian undergraduate students above load and set fee levels for these students;
- there are no restrictions on the way universities actually teach their students. Staff-student ratios and the use of capital, for example, are entirely up to the universities; and
- there are also no restrictions on other activities of the universities which may produce income, apart from the framework provided by competitive neutrality principles.

So what are universities likely to do in this sort of environment to pay wage increases? In this context, it is worth noting Ian Castle's point that you would expect all workers, including public sector workers such as academics, to get wage rises more or less in line with the rest of the community in the longer term (Chapter 2).

Figure 11.D1: **Sources of income in the Australian higher education system, 1996** (per cent)

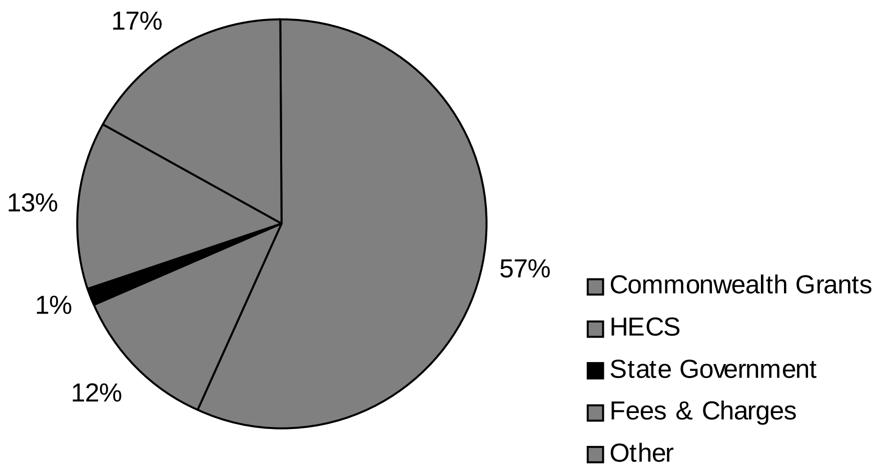
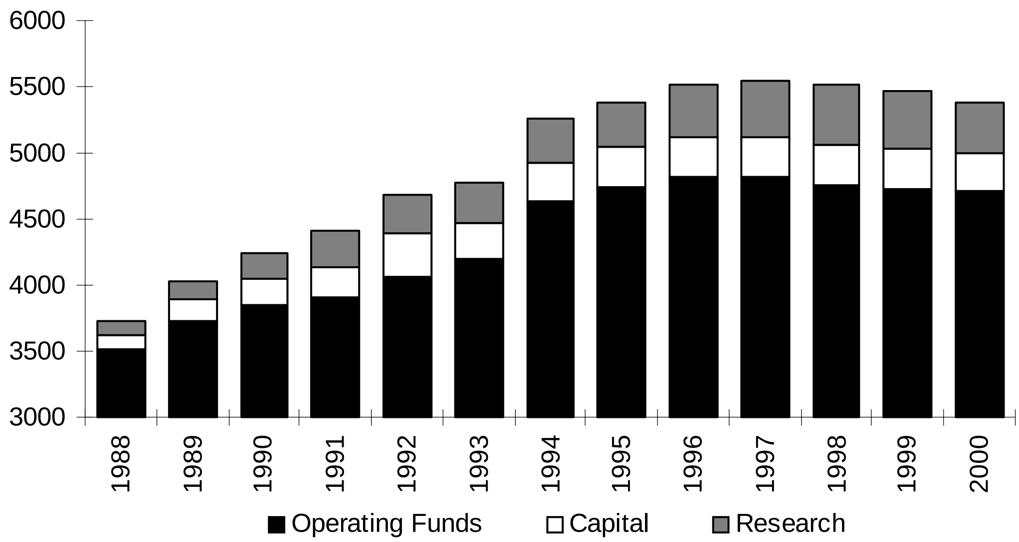



Figure 11.D2: **Commonwealth funding of higher education in Australia, 1988 to 2000** (dollar millions, 1998 outturn prices)




*Source*: DEETYA estimates.

It is fairly clear that there will be pressures to remove inefficiencies in universities in order to fund pay rises. You would also expect to see increases in efforts to produce income from other sources, rather than just teaching Australian students. That is, one would expect the balance between the teaching of government funded Australian undergraduates and other activities to change. Universities could be expected to become more entrepreneurial and responsive to demands in revenue raising areas such as overseas students, post-graduate fee paying students, consultancies and other fee for service activities.

So what does this mean in terms of microeconomic reform? We should end up with more efficient universities, and we certainly would expect to see universities more responsive to those in the private sector purchasing their services. From the point of view of microeconomic reform, we have the obverse of the general notion that freeing up a product market leads to pressures on the labour market. In the higher education sector, we have a situation where freeing up the labour market leads to pressures on the product market.

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## **Discussant** — *Steven Kates*

The Australian Chamber of Commerce and Industry (ACCI) does a quarterly *Survey of Investor Confidence* and one of the questions we ask in it is this, ‘What is holding back your level of investment?’ Among the 20 options given, two are ‘union resistance to change’ and ‘employee resistance to change’.

Until I was asked to speak at this Workshop, the only use to which I had put this data was to compare the two series. ‘Union resistance to change’ was always a much bigger constraint on investment than ‘employee resistance to change’. This did not surprise me, but I was always interested to see it confirmed.

We began the survey in 1991 and now have a data set that is seven years old which, as it happens, is a time period more or less coincident with the time period since wage indexation was abandoned and a productivity based system was introduced.

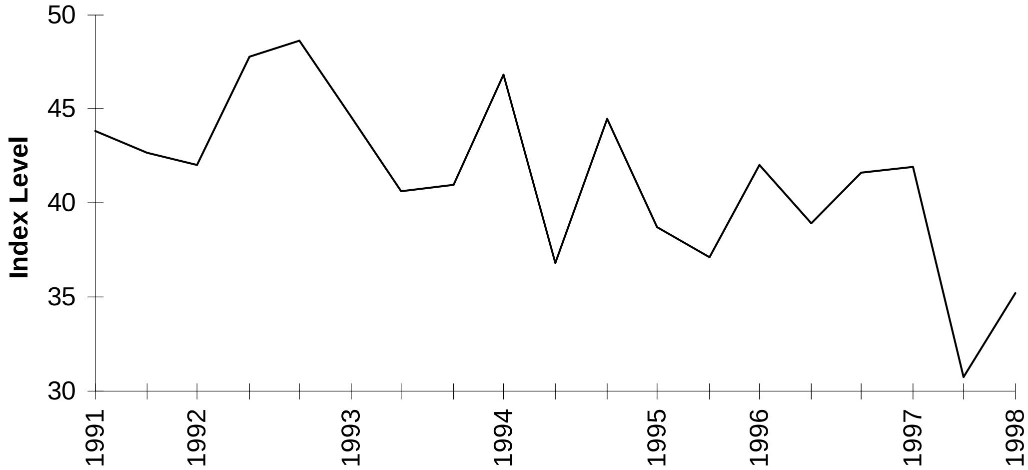
What I had never really looked at before in isolation was the trend in the data on union resistance to change. This I have now done, and what the data tell us is that employers across the country, in replying to our survey, say that union resistance to change, even though it is remains a problem, is a diminishing problem (Figure 11.D3). It is a lesser constraint on investment now than it was at the beginning of the process when a productivity based industrial relations system was first introduced.

Thus, in talking about productivity growth and microeconomic reform, I think what these data provide are an indication that the microeconomic reform agenda, at least as it applies to the workplace, is leading to an improvement in productivity. While the improvement is difficult to quantify, it is tangible. Things are going on at the workplace through changes to the industrial relations system that are making businesses more productive.

What those who operate businesses are trying to do at every stage is make changes that will make their firms more profitable and more productive. Businesses are run by hard-headed people who are continuously thinking about how they can make more money and do so in a very competitive environment.

Thus, in talking about getting away from a centralised system of wage fixation, which entails moving away from across-the-board wage fixation and moving towards enterprise negotiations, what we are looking at are attempts to change the environment in which business operates so that businesses, one by one, can become more productive.

Figure 11.D3: **Union resistance to change as a constraint on investment**




*Source*: ACCI Survey of Investor Confidence.

The statistic put up by Judy Sloan showed that not everyone feels they are becoming more productive. But the statistic also showed that many of them think they are. Certainly a fair chunk of businesses believe they are more productive because of the changes going on. All of that is translating into a better economic performance across the country.

So while the original intent of the centralised system remains, as it says in the Constitution, ‘to prevent and settle industrial disputes’, the form in which that role is being handled is now changing in ways which are actually improving business productivity. Therefore, when you aggregate, productivity is improving across the country.

So in contrast to what some have argued, my own observation, and my own participation in this process, tells me that microeconomic reform does make a difference and it does raise productivity, and we are getting dividends from this process.

But the second point I wish to make is that old habits die hard. We are still adjusting award wages through national wage case decisions. Right now we are in the middle of what the union movement calls the ‘living wage case’. The name itself is an attempt by the Australian Council of Trade Unions (ACTU) to pull the wool over people's eyes by describing its claim in ways which are quite different from the reality.

As the unions tell it, they are only trying to help the lowest paid by raising the minimum wage. What they really want to do is raise not just the minimum wage, which is $359.40, but to raise award rates by $20.60 at every level of the award structure.

Before the case began, I must say I had been lulled into some kind of false sense of security. Inflation was very low, the lowest it had been in 30 years. We had unemployment falling for the first time since 1995. It had been stuck at 8.7 per cent; it is now falling, and the trend is downwards. We have business growth picking up for the first time in three or four years. And we have the problems with Asia menacing us, with unknown consequences, but with this one certainty, that most of the consequences will be to our detriment.

I thought we would merely present the facts and that would be that. But having now been involved with the case, I have begun to worry that rather than the Commission saying, 'forget it', it may do something else.

The government has offered $8 on awards up to $451 per week. The emphasis of the trade unions in presenting their case has been on the lower paid, even though the decision will affect far more employees than those on the bottom of the wage structure. Even though people on a thousand dollars a week would get this increase, the emphasis has been on the lower paid.

Following from the Reserve Bank's intervention last year, when it threatened to raise rates if the Commission granted the ACTU claim, a belief seems to have developed that a higher increase could have been afforded. Having not granted the increase last year, and having then found the CPI negative during the succeeding twelve months, may have suggested that there was room to have given more.

It is certainly the view of the ACTU, based on the strength of the economy this year, that a larger increase could have been afforded. The possibility that conditions are as good as they are now because their claim last year was rejected seems to have escaped them entirely. Thus, whatever progress we seem to make seems to be slow and incremental. But there is progress and living standards have again begun to rise as a result. One could only wish that it were faster than it is.

Let me now go back to where I began. The question is, what are we to do about productivity? Well, as was stated by Catherine Morrison (Chapter 2), productivity is a 'buzz word'. Productivity is a term filled with hidden connotations but with little active meaning for most non-economists. In here, amongst economists, it is not a buzz word. In here, we all know what it means. We have very definite views. We know deeply as economists what productivity means and how it matters, and how differences of half a per cent a year translate ultimately into a substantially higher standard of living. That is what we know as economists, but my fear is that if you walk outside of a group of economists, there is little appreciation of its importance?

I am not trying to be critical of those who specialise in other fields, but it is my experience that most people do not understand the need to get productivity growth up; nor do they understand how it will matter and how it will translate into higher standards of living for themselves.

So when we are discussing productivity, I think it is not enough for us just to come to the conclusion about how productivity might be raised. We must go beyond that and develop mechanisms for explaining to those who are not economists, and who do not have our specialist understand of what productivity is, why productivity really matters in their own lives and in the real world.

## General discussion

The discussion focussed on the following themes:

- the effect of unions on productivity;
- the interaction of product markets and labour markets in determining productivity outcomes;
- the Accord wage setting system; and
- the interaction of the education and labour markets.

### The role of unions

Two broad views of the effects of unions on productivity were expressed. Some felt that unions had a deleterious impact on productivity. However, others pointed out that theories such as collective voice suggest that unions can have a role to play in enhancing productivity. The basis of these theories is that by expressing members concerns to management, unions can reduce staff turnover and improve information flows within firms. Some suggested that it may be the structure of unions that is causing productivity problems in Australia, rather than the concept of unionism itself. It was also suggested that a lot of employers actually preferred to deal collectively with their employees, possibly through a union. The slow take up of the introduction of individual workplace agreements (ie AWAs) under the changed industrial relations system was cited as evidence for this claim.

### The interaction of product markets and labour markets

Many concurred on the link between product market competition and labour market reform. The industries that were facing the stiffest competition, often from imports, in the product market were also the ones where workplace reform was more rapid. For example, following a significant reduction in chemical tariffs, and a concomitant increase in import competition, ICI Botany Bay started to operate at a loss where they had previously enjoyed good returns on equity. This induced the company to embark on a quite radical program of workplace reform. Similarly, it was suggested that as companies operating in the resource sectors are selling into very competitive world markets, there was an increased push for productivity enhancing work arrangements in their industries.

## The Accord

One participant raised the question of whether the Accord may have been a useful policy in hindsight. It allowed a substantial program of macroeconomic and microeconomic reform to occur in Australia without a large number of labour disruptions. This enabled some of the negative effects of the adjustment process on productivity or employment growth to be ameliorated. Judith Sloan conceded that, while she was not known as a supporter of Accord processes, they may have had some advantages in the respects cited. However, she also expressed the view that while the Accord may have aided the reform process, there is still room for further improvement in terms of labour market outcomes. Australia still has a highly regulated labour market and a third party — the AIRC — that is setting minimum wages.

## The interaction of the education and labour markets

Some participants expressed the view that enterprise bargaining in universities was a result of institutional change desired by governments rather than universities. One participant noted that the differential HECS system recently introduced had some perverse incentives. These stemmed from the decision to base the differential rates on a combination of course costs and expected pecuniary benefits, rather than course costs alone. For example, if HECS charges for law units were based on the income of some corporate lawyers, there would be a large number of law students who would never receive a level of pecuniary benefits implicit in the charge.

Finally, the view was expressed that allowing universities to charge up-front fees without ensuring that students had access to a loan mechanism was a very poor piece of microeconomic reform. An adverse effect of such a program may be that it reduces the scope for lower income, talented students to obtain higher education. It was suggested that a scheme providing income-contingent, budget-neutral cover might be feasible.

# 12 MICROECONOMIC REFORM AND DISPLACED WORKERS — AN INTRODUCTION

*Jeff Borland*[1]

## 12.1 Introduction

Few areas of government policy in Australia have in recent times attracted as much attention as microeconomic reform. Over the past two decades, there have been extensive changes to government regulation of the economy at a micro level. The main reforms can be usefully characterised as:

- international trade — reductions in levels of effective protection for import-competing goods produced in Australia;
- product markets — reforms to a variety of product markets (eg deregulation of agricultural commodity markets, banking and finance sector, and telecommunications sector);
- labour markets — changes to arrangements for setting wages and conditions of employees; and
- government sector — privatisation of government assets, and contracting-out of provision of publicly funded goods and services.[2]

One important consequence of microeconomic reform is its effect on labour demand in the economy. For example, reductions in tariffs on imports of clothing are likely to cause lower employment in the clothing industry, while creating opportunities for extra employment elsewhere in the economy. Or contracting-out of a local government activity such as garbage collection, may involve substituting private sector employees for local government employees in that activity.

Where microeconomic reform causes changes in labour demand, it will initiate a process of adjustment in the labour market. The eventual effects of this

[1] I am grateful for helpful comments from Sally Weller and the discussants on an earlier draft of this paper, and to Iain Campbell, Lynne Williams and David Worland for assistance with references.

[2] See Forsyth (1992), and Quiggin (1996) for comprehensive overviews of the development of microeconomic reform in Australia.

adjustment process may involve changes to the overall level and industry composition of employment, changes to workers' average earnings, and changes to labour productivity (Freebairn 1993). Part of the process of adjustment is likely to be that some workers will lose their jobs. Such workers are usually referred to as 'displaced workers' that is, workers who are involuntary permanent job losers, and whose job loss is related to adverse economic conditions rather than individual job performance.

The issues of labour market adjustment and displaced workers have not received much serious attention in academic research or public debate on microeconomic reform.[3] Yet it seems that there are important reasons from welfare economics and political economy perspectives for thinking that these issues should occupy a central place in analysis of the consequences of microeconomic reform.

This paper attempts to provide a starting point for analysis of the topic of microeconomic reform and displaced workers in Australia. The main objective is to present a range of background information which will be useful for undertaking research on microeconomic reform and displaced workers, and to suggest an agenda for research on the topic.

Section 12.2 makes a number of arguments for why displaced worker effects need to be taken into account in policy making on microeconomic reform. Section 12.3 provides a conceptual framework for thinking about the labour market adjustment effects that occur where microeconomic reform causes worker displacement. Section 12.4 reviews existing empirical evidence on the incidence and costs of worker displacement in Australia. In section 12.5, various policy issues are addressed. Section 12.6 contains concluding comments and suggests how a start might be made in undertaking research on the labour market adjustment effects of microeconomic reform.

It should be noted at the outset that by highlighting one type of cost which may be attributed to microeconomic reform, it is not the intention of the paper to suggest that microeconomic reform is never a desirable policy. What it does emphasise, however, is that an appropriate assessment of the desirability of microeconomic reform must weigh the benefits against the costs of reform. Where the social costs of some reform (including labour market adjustment costs) outweigh its social benefits then it will not be optimal to proceed with that reform. However, where microeconomic reform imposes adjustment costs on some workers in the labour market, but overall the benefits of the reform are

3 And where there is no serious research anything goes. Take for example the claim by music industry lobby groups that removing parallel importation restrictions on CDs would cost 55,000 jobs — when ABS statistics show that only about 4,000 people are employed in the music industry (Scott 1997).

considered to outweigh the costs, then from an efficiency perspective, the reform would be judged desirable. Where reform is desirable on efficiency grounds, in theory it should also be possible to resolve concerns over equity by making a transfer from parties who gain from the microeconomic reform to workers who suffer costs from the reform such that both groups are left better off.

## 12.2 Why are displaced workers important?

What makes displaced workers relevant to analysis of microeconomic reform? Two main answers to this question can be offered. First, from a traditional welfare economics perspective, a proper assessment of the efficiency and equity consequences of microeconomic reform requires the labour market adjustment effects of that reform to be taken into account. Second, from a political economy perspective, the role of displaced workers is integral to understanding the historical evolution of policies for microeconomic reform in Australia, and for developing policy proposals for future reform.

### 12.2.1 Welfare economics

*Efficiency*

Microeconomic reform — interpreted as policy action to increase productivity — will have the effect of shifting the allocation of resources in the economy. One way to think about this change is to imagine two resource allocation ‘states’ — a pre-reform state which is the allocation of resources to production activities prior to microeconomic reform; and an hypothetical post-reform state which would exist after all the effects of microeconomic reform had worked through the economy assuming that no other exogenous changes occur in the meantime.

An overall measure of the efficiency consequences of microeconomic reform is obtained by taking the present discounted value over all future periods, of the difference between output or consumption in the post-reform and pre-reform states. At one extreme, it is possible to think of the case where the allocation of resources adjusts instantly following the implementation of microeconomic reform. In this case, the appropriate measure of efficiency effects of microeconomic reform is the present discounted value — from the date of reform onwards — of the difference in output or consumption between post-reform and pre-reform states.

A world with instant adjustment is however a world without displaced workers. Once it is acknowledged that there are likely to be some workers whose jobs are destroyed by microeconomic reform who do not immediately find re-employment, or that it is likely to take time to find workers to match to new jobs created by that reform, then the shift between pre-reform and post-reform states will not be immediate. In calculating the overall efficiency effects of microeconomic reform, it will now be necessary to take account of the transition period during which the economy is shifting towards (but has not reached) the post-reform allocation of resources. Over this transition period, output and consumption will be below their levels in the post-reform state. Hence, there will be a number of periods where the output or consumption gain from microeconomic reform is less than the difference between output or consumption in the post-reform and pre-reform states. In this case, the present discounted value of the increase in output or consumption due to microeconomic reform will be lower than where adjustment occurs instantly.

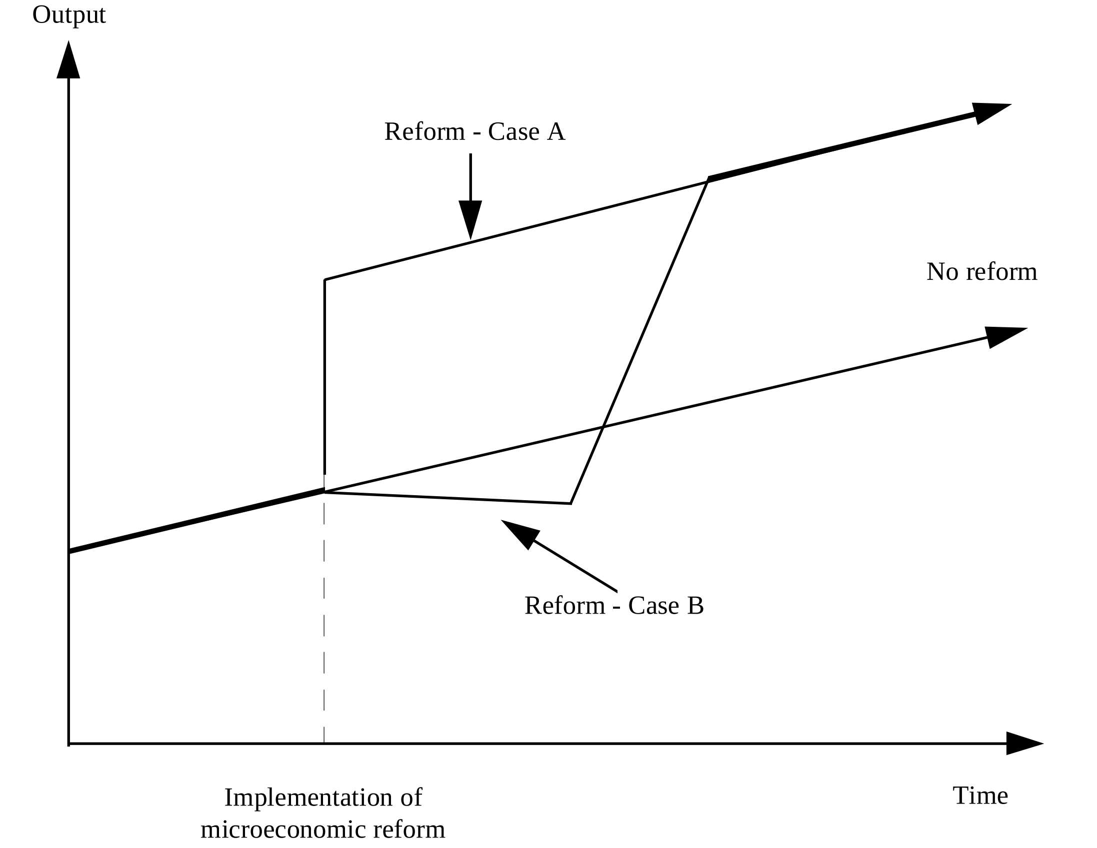
Figure 12.1 illustrates some alternative transition paths in output which might be possible following the implementation of microeconomic reform. The ‘No reform’ path shows the evolution of output in the case where no microeconomic reform takes place. The path ‘Reform — Case A’ shows how output would shift following the implementation of microeconomic reform where adjustment to reform is instantaneous. The other path ‘Reform — Case B’ shows a case where adjustment to the post-reform output level does not occur instantly. In fact in this case, it is assumed that output initially falls below the level which would exist in the absence of reform, before increasing to the post-reform output path. Depending on the discount factor, it is possible that in the ‘Reform — Case B’, it will not be optimal on efficiency grounds to implement the microeconomic reform.

Taking explicit account of the adjustment process following microeconomic reform — of which displaced workers are an important component — is therefore necessary for accurate measurement of the efficiency consequences of reform.[4] As an example, Quiggin (1997) in a critique of Industry Commission estimates of the efficiency gains from microeconomic reform, argues that taking

4 The necessity of taking account of adjustment costs in benefit-cost evaluations of microeconomic reform is recognised in many areas of policy-making. For example, the Australian Consumer and Competition Commission (ACCC 1997, p. 20): ‘...The Commission has authorised various schemes in rural industries following deregulation. In assessing such schemes, the Commission was prepared to accept that there would be a public benefit in mechanisms that facilitate the transition from a regulated industry to a deregulated scheme. This position helped to avoid a dislocation that would be caused by a too sudden move from regulation to deregulation.’

account of medium-term unemployment and labour force withdrawal that occur due to microeconomic reform reduces the size of estimated labour productivity gains from microeconomic reform in Australia by about 25 per cent.

Figure 12.1: **Effect of microeconomic reform on output, alternative transition paths**




### *Equity*

Where a government has equity objectives which it is seeking to achieve, it may be necessary to take account of the effects of microeconomic reform on the distribution of income. One way in which microeconomic reform will have consequences for the distribution of income is through worker displacement. For example, displaced workers may have lower lifetime incomes because of the time which they spend out of employment following displacement. On the other hand, lifetime incomes of workers who obtain new jobs may be higher than would otherwise be the case; and as well, workers in industries affected by microeconomic reform who are not displaced may receive higher earnings due to increases in labour productivity. Hence, there are a variety of ways in which the implementation of microeconomic reform may affect the distribution of income, and therefore be of relevance to equity objectives of the government.

### 12.2.2 Political economy

The nature of microeconomic reform which occurs in Australia is of course determined through a political process. Private-interest theories of regulation suggest that outcomes from a political process can be interpreted as the result of competition between opposing interest groups (Stigler 1971). In the case of microeconomic reform, the ‘gainers’ are likely to be a large dispersed group each of whom will receive a small fraction of the total benefits of reform; whereas, the ‘losers’ will be small in number so that each will bear a large fraction of total costs of reform. In addition, losers are likely to be geographically concentrated, and to have an existing collective organisational structure (eg trade union or agricultural producer board). Hence, workers who may be displaced from their jobs by microeconomic reform have greater incentive and capacity to affect policy reform than does the group which will gain from that reform.

The political economy of policy-making therefore suggests that in order to understand the evolution of microeconomic reform in Australia, it is necessary to understand the role of displaced workers in the policy-making process. It also indicates that for governments to be able to implement policies for microeconomic reform, those policies must explicitly address issues of adjustment assistance and compensation for displaced workers.

## 12.3 Effects of worker displacement — a conceptual framework

This section presents a framework which can be applied to describe the consequences for workers displaced through implementation of microeconomic reform. In the first sub-section, a taxonomy of possible effects of displacement is presented. In the second sub-section, the main determinants of the magnitude of those effects are discussed. The approach in this section is ‘partial equilibrium’ in that it focuses on the effects of microeconomic reform on displaced workers, and does not consider the implications for other workers or labour force participants.

### 12.3.1 What are the effects of worker displacement?

The effects of labour market adjustment for an individual displaced worker will depend on:

- time spent out of employment; and
- effects associated with a change in job for a worker who is re-employed following displacement.

To obtain a measure of the total effects of worker displacement due to some episode of microeconomic reform, it is necessary to aggregate over all individual workers displaced by that reform.

Concerning time out of employment, displaced workers may have a variety of labour market experiences. Where the date on which those workers are to be retrenched is pre-announced, some workers may be able to obtain new employment positions and to shift jobs prior to the retrenchment date. This group of workers will have no time spent out of employment. Workers who have not obtained a new employment position at the date of retrenchment will, however, be forced to shift into unemployment or to move out of the labour force. During the period between the date of retrenchment and the time of obtaining a new employment position, those displaced workers may receive some type of social security benefit payment (for example, unemployment benefits or disability pension). The difference between wage payments in the previous job and the size of benefit payments represents a private cost from time spent out of employment for each displaced worker. This cost will be increasing with the amount of time a worker spends out of employment, and with the gap between wage payments and benefit payments for the displaced worker.

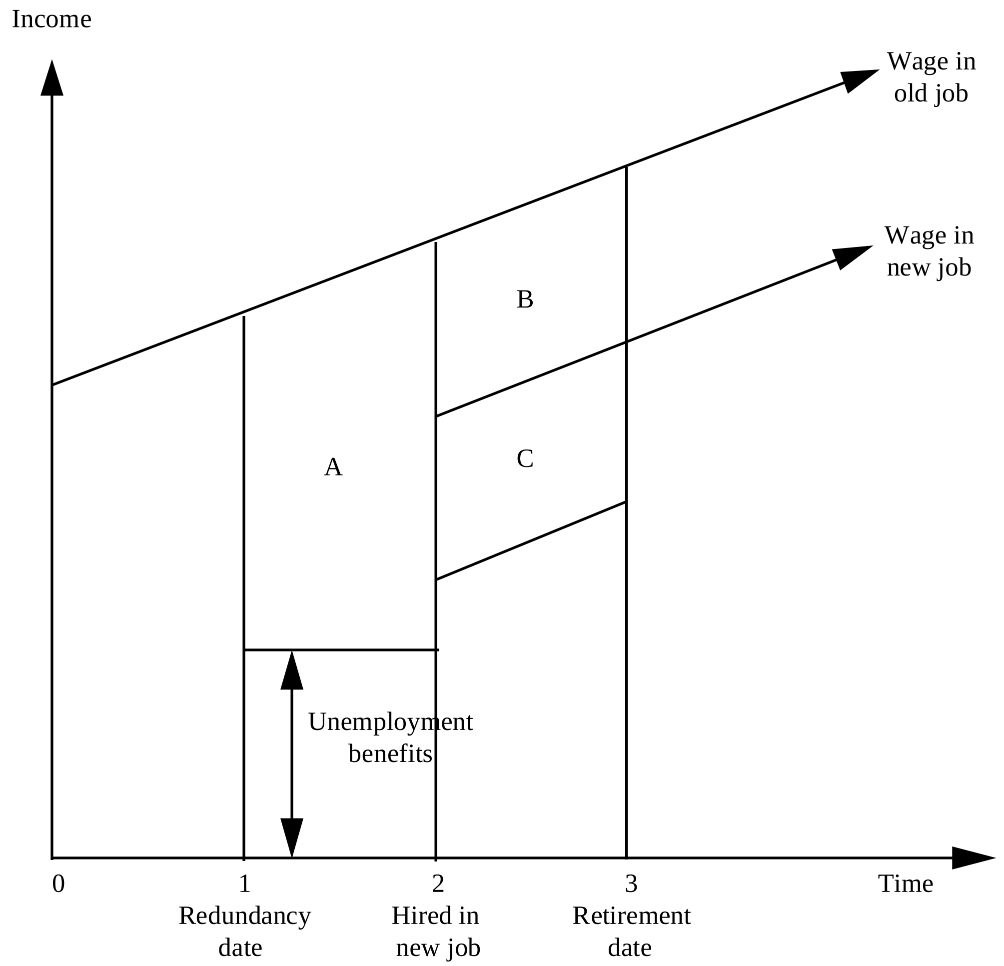
Concerning effects associated with job change for displaced workers who obtain a new employment position, there may be differences between the characteristics of their new jobs and the previous jobs from which they were retrenched. First, a worker’s career profile of earnings may differ between the jobs. For example, earnings in a worker’s new job may be lower (higher) than if the worker had been able to remain in the pre-displacement job. Reductions (increases) in lifetime earnings of a worker due to a switch in jobs represent one monetary effect of labour market adjustment for displaced workers who are re-employed. Second, in order to obtain a new employment position displaced workers may incur monetary costs from searching for a new job, from retraining, or from moving between geographic regions (eg transactions costs and capital losses incurred in changing houses).

These types of effects of labour market adjustment for a displaced worker are illustrated in Figure 12.2. In the example in Figure 12.2, it is assumed that a displaced worker spends some time out of employment, and then obtains a new job with an earnings profile below the profile in the old job. Of course, there are many other types of post-retrenchment labour market outcomes which might be experienced by displaced workers. For example, a displaced worker might obtain a new job immediately upon retrenchment and might have a higher earnings profile in that new job than in the old job; or alternatively, might have several periods of unemployment interspersed with periods of employment (full time or part time) following retrenchment.

In the example in Figure 12.2, the worker has a pre-displacement job — from time 0 to time 1 — in which the earnings profile is indicated by 'wage in old job'. At the date of retrenchment — at time 1 — the worker's income falls to the level of unemployment benefits and remains at this level during the worker's period of non-employment. At the date of hiring into a new job — at time 2 — the worker's income increases and in that new job the worker has an earnings profile as indicated by 'wage in new job'. Area A therefore represents adjustment costs due to time out of employment for the displaced worker. Area B is the adjustment cost effect to the displaced worker receiving lower earnings in the new job than in the pre-displacement job. And area C represents extra adjustment costs for the displaced worker due to factors such as moving between regions and costs of obtaining a new job (amortised over the remainder of the worker's career).

The effects of labour market adjustment which have been described thus far involve monetary costs/benefits. Of course, there are also likely to be significant non-monetary adjustment effects. For example, the necessity to move between regions to obtain employment may involve substantial social dislocation for a worker's family; or the experience of unemployment may have adverse consequences for a worker's health.

Figure 12.2: **Costs of labour market adjustment for a displaced worker**




### 12.3.2 What determines the effects of worker displacement?

Many factors are likely to affect the labour market performance of displaced workers. A taxonomy of these factors can be made as:

- extent of reform — number of workers displaced by an episode of microeconomic reform. The greater the number of workers displaced by some reform the more difficult it will be on average for a displaced worker to obtain a new job. This is likely to be a particularly significant factor where displaced workers are located in a small-size, local labour market such as a rural town;

- individual characteristics of displaced worker — age, skill, job/industry/occupation, years of tenure, union status, family type, and home-ownership status. For example, older workers may have a lower probability of re-employment due to a perception by employers that they will be less flexible or that the returns to training these workers are relatively low. Also, years of tenure (as a proxy for a worker's level of firm-specific or industry-specific human capital) may be positively correlated with the amount of wage loss suffered by a displaced worker during a period of unemployment and in a new job;
- local labour market conditions — size of labour market, job composition in labour market, and rate of unemployment in labour market. For example, a displaced worker's opportunities for matching with a new job are likely to be highest in a local labour market with a large number and diverse mix of jobs. Local labour market conditions also will be strongly influenced by macro-level labour market outcomes;
- firm/product-market of displaced worker — level of non-competitive 'rents' at firm or industry level. For example, suppose a displaced worker has been employed at a firm which earns product market rents from some source (such as barriers to entry to the market), and some of those rents have been shared with labour in the form of higher wage payments. Then it would be expected that this worker would experience larger wage losses from displacement than an identical worker at a firm which did not earn product market rents; and
- institutional setting — regulation of worker retrenchment, benefits for unemployed persons, wage-setting system and labour market assistance programs. For example, changes in wages for displaced workers who switch between jobs may be lower in a labour market with a centralised wage-setting system than a decentralised wage-setting system. Also, regulation of worker retrenchment which increases the costs of laying off workers (eg legal requirements to pay severance payments) may reduce the extent of displacement and lower the income losses for those workers who are displaced.

## 12.4 Evidence for Australia

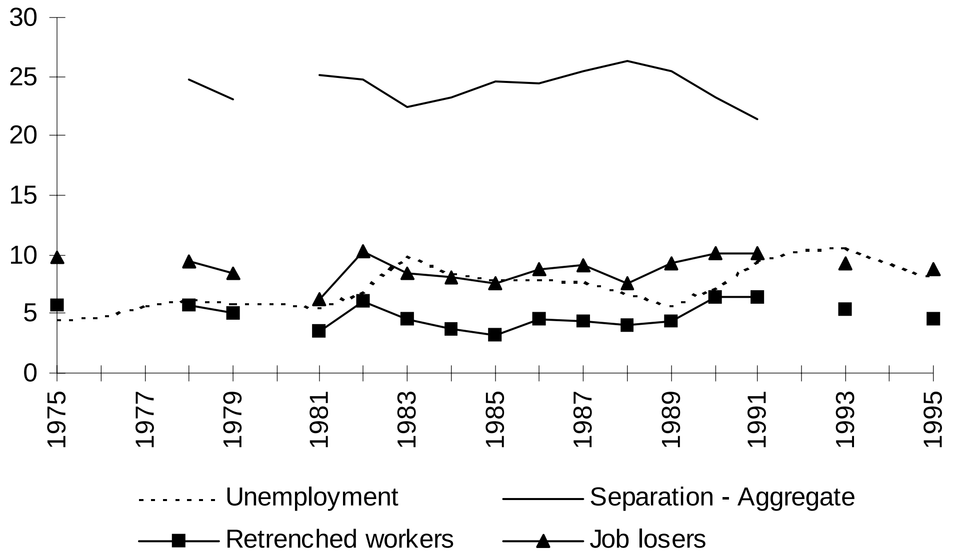
In this section, a range of empirical evidence on the experiences of displaced workers in Australia is reviewed. This evidence is of three main types — aggregate information on levels of worker displacement in Australia, information from a population survey of displaced workers in Victoria, and case study evidence. Most of the empirical evidence that is reviewed does not relate specifically to workers displaced by microeconomic reform. However, undertaking a general review of the existing literature seems useful for illustrating available data sources, and the types of approaches which exist for studying the consequences of microeconomic reform.

### 12.4.1 Aggregate evidence

Aggregate evidence on the rate of worker displacement and on other types of job separation are available for various years between 1975 and 1995. The source for these data is the Supplementary Labour Mobility Survey to the Australian Bureau of Statistics (ABS) Labour Force Survey. Rates of job separation, together with the rate of unemployment, are displayed in Figure 12.3.

From Figure 12.3, it is evident that the average rate of aggregate job separation is about 25 per cent of the number of persons who had a job during the calender year. The average rate of job separation due to retrenchment is about 5 per cent; and the rate due to job loss is about 9 per cent. It is evident that the aggregate rate of job separation is inversely correlated with the rate of unemployment. Job separation rates due to retrenchment and job loss display a positive correlation with the rate of unemployment. Over the period between 1975 and 1995, the aggregate rate of job separation displays a slight downward trend. The rate of job separation due to retrenchments on the other hand appears to be trended upwards from the 1980s onwards. For example, in 1983 and 1985 rates of job separation due to retrenchment were 4.6 per cent and 3.1 per cent respectively; at similar points in the business cycle in the 1990s, 1993 and 1995, rates of job separation due to retrenchment were 5.4 per cent and 4.6 per cent. An upward trend in job separations due to retrenchments may be one factor which explains perceptions of increasing job insecurity in the workforce.

Figure 12.3: **Annual rates of job separation and rate of unemployment, persons, Australia,[a,b] 1975 to 1995**
(per cent)




a The rate of unemployment is equal to the number of persons in the workforce who are unemployed divided by the total number of persons in the workforce.

b The rate of job separation for each category is equal to the number of job separations divided by the total number of persons who had a job during the calender year. Job separations - aggregate is equal to the number of workers who ceased a job during the calender year. Job separations - retrenched workers is equal to the number of workers who ceased a job during the calender year whose reason for ceasing their last job was retrenchment. Job separations - job losers is equal to the number of workers who ceased a job during the calender year whose reason for ceasing their last job was retrenchment, ill health, or seasonal or temporary-job termination.

*Source*: ABS, Cat. No. 6209.0.

Average retrenchment rates for workers in disaggregated tenure categories can also be calculated using information from the ABS survey.[5] Table 12.1 shows the average rate of job separation due to retrenchment in Australia in 1995 in

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[5] Average rates of job separation — retrenchment for employees in disaggregated tenure categories are calculated as:

$$\mathrm{Prob}(D_{it} = 1 | T_{it} = j) = [\mathrm{Prob}(T_{it} = j | D_{it} = 1) * \mathrm{Prob}(D_{it} = 1] / [\mathrm{Prob}(T_{it} = j)]$$

where $\mathrm{Prob}(D_{it} = 1 | T_{it} = j)$ is the probability that an employee is retrenched in time period *t* given that the employee is in tenure category *j*; $\mathrm{Prob}(T_{it} = j | D_{it} = 1)$ is the probability that an employee is in tenure category *j* given that the employee has been retrenched in time period *t*; and $\mathrm{Prob}(D_{it} = 1)$ and $\mathrm{Prob}(T_{it} = j)$ are respectively the probabilities that an employee is retrenched and that an employee is in tenure category *j* in time period *t* (Farber 1993, p. 89).

different tenure categories. The main finding is that the rate of retrenchment declines with years of tenure of an employee — in particular for employees with up to five years of tenure.

Table 12.1: **Average rate of job separation — retrenchment by years of tenure, Australia, 1995**

| *Years of tenure* | *Rate of job separation* |
|---|---|
| Less than one | 0.098 |
| One to less than three | 0.045 |
| Three to less than five | 0.028 |
| Five to less than ten | 0.024 |
| More than ten | 0.020 |

*Source*: ABS, Cat. No. 6209.0 (February 1996).

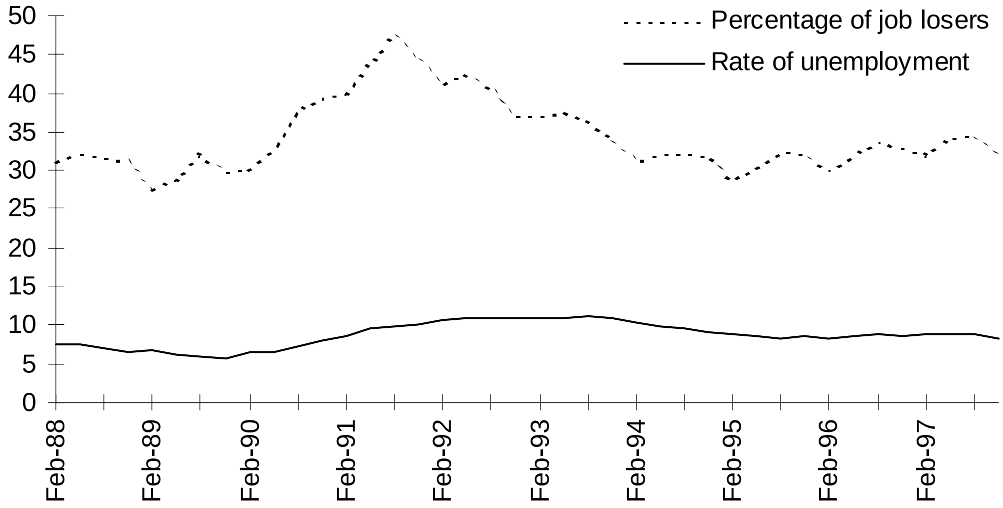
How important are displaced workers in aggregate unemployment in Australia? With this question in mind, Figure 12.4 presents information on the proportion of unemployed persons who were retrenched from their last job. Two main features stand out. First, at any point in time a large proportion (over 30 per cent) of unemployed persons have been retrenched from their last job. Second, retrenched workers are a larger proportion of total unemployment during recessions than in periods of economic recovery.

### 12.4.2 Population survey evidence

Population-type surveys can provide individual-level information on the incidence of worker displacement and experiences of displaced workers.[6] The only Australian evidence of this type is from a supplementary survey to the ABS Labour Force Survey undertaken in Victoria in 1993 (see ABS, *Retrenched Workers and Workers Who Accepted Redundancy Packages, Victoria*, October 1993, Cat. No. 6266.2). This survey collected information on whether a respondent had been retrenched from a job between October 1990 and October 1993; the characteristics of the job from which the respondent had been displaced; reason for retrenchment; respondent's labour force status in October 1993; and the respondent's personal characteristics.

[6] For surveys of United States and Canadian evidence on displaced workers derived from population surveys, see Hamermesh (1989) and Fallick (1996).

Figure 12.4: **Job losers as a percentage of unemployed, and the rate of unemployment, persons, Australia, February 1988 to November 1997** (per cent)




*Source*: ABS Cat. No. 6209.0.

The main findings from the survey were that:

- over 1 in 10 persons who had been employed between October 1990 and 1993 had been retrenched from a job during that period;
- in October 1993, the rate of non-employment of persons who had been retrenched in the previous three-year period was 49.2 per cent compared with 17.6 per cent for the whole population; and
- The rate of non-employment amongst retrenched workers was highest for persons in older age groups (50+ years), higher for females than males, greater for persons without post-school qualifications than with post-school qualifications, and highest for persons with short tenure (less than 6 months) or very long tenure (greater than 10 years) in the jobs from which they were retrenched.

### 12.4.3 Case study evidence

A range of case study evidence on the experiences of displaced workers in Australia is available.[7] The main types of case studies undertaken have involved samples of workers displaced in plant closures, and samples of displaced workers drawn from databases of unemployed persons (eg the Commonwealth Employment Service register). The former type of study is generally restricted to a single plant closure, whereas the latter type of study can cover multiple plant closures. These case studies provide information on the labour market experiences of displaced workers, and on other monetary and non-monetary consequences of displacement.

#### *Labour force status at date of case study*

One perspective on how displaced workers fare in the labour market is to examine the proportion of those workers in employment at some date after displacement. Table 12.2 and Figure 12.5 present a review of this information from case studies for displaced workers in Australia.

It is evident that there is large variation in the proportion of displaced workers in employment at the specified dates following displacement. For example, Curtain and Hopkins (1986) find that only about 32 per cent of workers displaced by the closure of a white good manufacturing plant were in employment 12 months after displacement; on the other hand, Dunn and O'Neill (1992) find that about 64 per cent of workers displaced from ship construction in Newcastle were re-employed after the same time interval.

There does however appear to be some evidence that the proportion of displaced workers in employment increases with time since displacement. For example, the majority of studies which sampled displaced workers at two points in time following displacement found that the proportion of displaced workers re-employed increased with time since displacement.[8]

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[7] The Appendix provides details of the case studies of displaced workers in Australia which are reviewed in this paper. For other surveys of the Australian case study literature on displaced workers see BIE (1985), Taylor (1986), Wooden (1988), and Webber and Campbell (1996).

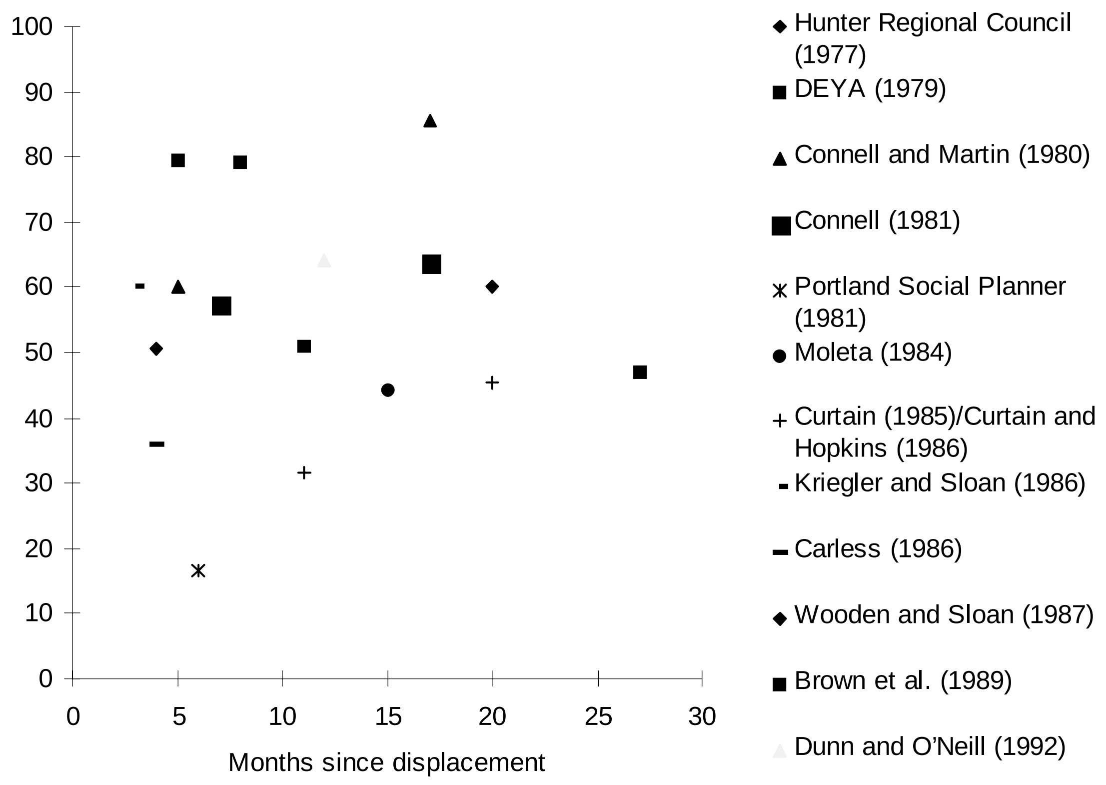
[8] However, regression analysis finds no significant relation between the proportion of workers re-employed and months since displacement (either for whole sample of case studies or for those case studies with observations at multiple time periods following displacement).

Table 12.2: **Labour market outcomes for displaced workers — case study findings, Australia**[a] (by year of study)

| | | *Labour force status* | | |
|---|---|---|---|---|
| *Study* | *Time after displacement* | *Employed* | *Unemployed* | *Out of labour force* |
| Hunter Regional Council (1977) | 4 months | 51.5 | 39.4 | 9.1 |
| DEETYA (1979) | 5–6 months | 79.4 | 20.6 | 0 |
| Connell and Martin (1980) | 4–6 months | 60.0 | 40.0 | 0 |
| | 15–20 months | 85.7 | 7.1 | 7.1 |
| Connell (1981) | 6–8 months | 57.3 | 42.7 | 0 |
| | 15–20 months | 63.9 | 22.2 | 0 |
| Portland Social Planner (1981) | 6 months | 16.5 | 83.5 | 0 |
| Moleta (1984) | 12–18 months | 44.2 | 52.9 | 2.9 |
| Curtain (1985, and 1987)/ Curtain and Hopkins (1986) | 10–12 months | 31.6 | 47.4 | 21.0 |
| | 19–22 months | 45.3 | 29.1 | 25.6 |
| Kriegler and Sloan (1986) | 3 months | 60.0 | 21.0 | 19.0 |
| Carless (1986) | 3–5 months | 62.0 | 29.0 | 9.0 |
| Wooden and Sloan (1987) | 21 months | 60.0 | 11.0 | 29.0 |
| Brown *et al.* (1989) | 8 months | 79.0 | 12.0 | 9.0 |
| | 11 months | 51.0 | 19.0 | 30.0 |
| | 27 months | 47.0 | 18.0 | 35.0 |
| Dunn and O'Neill (1992) | 12 months (approx.) | 64.0 | 35.0 | 1.0 |
| Weller (1997) | 6 months | 16.8 | 77.2 | 6.0 |
| | 12 months | 24.2 | 68.1 | 7.7 |
| | 18 months | 38.1 | 45.9 | 16.0 |
| | 24 months | 47.1 | 32.8 | 20.1 |
| | 36 months | 51.8 | 23.8 | 24.4 |

a See appendix to this Chapter for details of case studies.

Figure 12.5: **Employment outcomes for displaced workers — case study findings, Australia** (percentage of displaced workers in employment)




In some instances, it is found that a large proportion of displaced workers move out of the labour force following displacement. This occurs mainly where older workers are displaced. For example, in the Brown *et al.* (1989) study of workers displaced from the Williamstown dockyard 36 per cent of those workers were aged 55 years and above; and in this case it was also found that 24 per cent of displaced workers shifted out of the labour force.

The nine main determinants of whether a displaced worker is in employment at the date of the case study are found to be:

- gender — there is a lower probability of re-employment for females than males. Females are less likely than males to shift between regions, and are more likely to shift out of the labour force following displacement;
- age — There is a lower probability of re-employment for workers aged more than 45 years than for workers aged less than 45 years. The highest

probability of exit from the labour force is for workers aged 55 years and over;

- skill — there is a higher probability of re-employment for skilled blue-collar and white collar workers than for unskilled blue-collar workers;
- family status — married males with dependents have a higher probability of re-employment than other males;
- country of birth — immigrants (and in particular non-English speaking background immigrants) have lower probabilities of re-employment than Australian-born displaced workers;
- length of unemployment spell following displacement — some evidence suggests that the probability of re-employment declines with the length of the unemployment spell following displacement;
- perceptions of 'degree of permanence' of plant closure — displaced workers are less likely to search for a new job where a plant closure is believed to be temporary;
- the number of displaced workers as a proportion of the total workforce in a region — as the size of the group of displaced workers relative to the workforce in a region increases, the average probability of re-employment for displaced workers in that region falls; and
- rate of employment growth in a region where a displacement episode occurs — higher employment growth is associated with a higher average probability of re-employment for a displaced worker. Rates of employment growth in local labour markets are also likely to be correlated with macro-level employment growth.

There is mixed evidence on the effect on re-employment probability, of the time that a displaced worker begins job search activity.

### *Duration of non-employment*

A second perspective on the employment outcomes of displaced workers is obtained from information on the duration of spells of employment and non-employment following displacement. Table 12.3 presents a review of case study information on the distributions of the duration of a displaced worker's first spell of non-employment and duration of all spells of non-employment.

Table 12.3: **Non-employment durations for displaced workers — case study findings, Australia** (percentage of displaced workers)

| | *Study* | | | | |
|---|---|---|---|---|---|
| *Duration of non-employment:* | *Connell (1981)* | *Moleta (1984)* | *Deery et al. (1986)* | *Carless (1986)* | *Brown et al. (1989)* |
| **a First spell** | | | | | |
| 0 months | 21.6 | 32.3 | 32.0 | | 12.0 |
| 0<months<6 | 40.1 | 16.9 | 53.0 | | 41.0 |
| months >6 | 38.3 | 50.8 | 15.0 | | 47.0 |
| **b All spells** | | | | | |
| 0 months | 5.8 | 26.6 | 20.4 | 44.0 | |
| 0<months<6 | 34.6 | 19.4 | 46.9 | 56.0 | |
| months >6 | 59.6 | 54.0 | 32.7 | na | |

na Not applicable.

Again, the most notable feature is that there is a high degree of variation between case studies in the experiences of displaced workers. For example, Connell's 1981 study of workers displaced from an electronics manufacturing plant found that around 5 per cent had no spell of non-employment; whereas, Carless's 1986 study of displaced workers from the Ballarat paper mill found that 44 per cent of those workers had no spell of non-employment.

The five main determinants of the length of time an individual displaced worker spends out of employment are found to be:

- age — average duration of non-employment is longer for displaced workers aged less than 25–30 years and older than 45–50 years than for other displaced workers;
- tenure — average duration of non-employment is longer for displaced workers with 5–10 years of tenure with their previous employer than for displaced workers with fewer years of tenure;
- state of local labour market where the displacement episode occurs — for example, a higher rate of unemployment in the local labour market at retrenchment date is associated with a longer average duration of non-employment for displaced workers;

- size and industry composition of the local labour market where displacement occurs — for example, a larger size local labour market is likely to increase a displaced worker's probability of finding a new job, and hence reduce average duration of non-employment; and
- the number of displaced workers as a proportion of the total workforce in a region.

There is mixed evidence on the relation between duration of non-employment and educational attainment, gender, skill level, and the date that a displaced worker begins job search activity.

### *Job characteristics for displaced workers who obtain employment*

Not a great deal of evidence is available from case studies on the types of jobs obtained by displaced workers. What evidence does exist is summarised in Table 12.4. In each case, a sizeable proportion of displaced workers who obtain re-employment are in jobs with lower skill requirements and lower earnings than their previous jobs. However on average, there is an equally large group of displaced workers whose new job has higher earnings and higher skill requirements than their previous job.

### *Other consequences of worker displacement*

Several case studies have examined other types of consequences of retrenchment (Ireland 1983, Curtain 1985, Carless 1986, Dowling *et al*. 1987, and Pearce *et al*. 1995). All these studies find that a significant proportion of displaced workers experience financial difficulties — particularly those workers with a home mortgage and/or dependent children. Other consequences of displacement which are cited are loss of social contacts, family relationship problems and ill-health.

### *Problems with case studies*

In interpreting this review of evidence from case studies of displaced workers in Australia, it is important to be aware of a number of shortcomings of this type of study:

- representativeness of data — most case studies of displaced workers in Australia have involved predominantly male manual workers. It is difficult to know whether labour market outcomes for these workers would correspond to outcomes for other types of displaced workers (eg, white collar workers displaced by public sector reform);

Table 12.4: **Job characteristics for displaced workers who are re-employed — case study findings, Australia**

| | | *Skill level* | | | *Earnings* | | |
|---|---|---|---|---|---|---|---|
| *Study* | *Time since displacement* | *Less* | *Same* | *More* | *Less* | *Same* | *More* |
| Ireland (1983) | | | | | | | |
| Age — 15–34 | 9-12 months | | | | 17 | 39 | 47 |
| 35–44 | | | | | 30 | 30 | 40 |
| 45–64 | | | | | 50 | 19 | 31 |
| Curtain (1985 and 1987)/Curtain and Hopkins (1986) | 19-22 months | 22 | 55 | 18 | | | |
| Deery *et al.* (1986) | 9 months | | | | | | |
| All | | | | | 62 | 23 | 15 |
| Blue-collar | | | | | 67 | 23 | 10 |
| White-collar | | | | | 50 | 21 | 29 |
| Kriegler and Sloan (1986) | 3 months | | | | 36 | 30 | 34 |
| Brown *et al.* (1989) | 8 months | 60 | 6 | 34 | | | |
| | 11 months | 72 | 14 | 14 | | | |
| | 27 months | 45 | 27 | 28 | | | |
| Weller (1997) | 24 months | | | | 37 | 36 | 27 |

- sample selection — in some case studies, the methods applied to choose samples of displaced workers for analysis may have caused unrepresentative samples of workers to be selected. For example, case studies of plant closures which sample a subset of workers displaced at the date of retrenchment will omit workers who leave the plant before that date — yet it seems most likely that workers who leave prior to the retrenchment date will have higher re-employment probabilities than other displaced workers. Alternatively, a difficulty with case studies based on samples of displaced workers drawn from databases of unemployed workers is that these workers are likely to have lower re-employment probabilities than other displaced workers. For example, Deery *et al.* (1986, p. 180) suggest that displaced workers '...who relied most heavily on the Commonwealth Employment Service (CES) were also those who were most vulnerable to prolonged unemployment';
- differences in methodology — each case study has applied its own particular methodology. For this reason, it is often very difficult to integrate the findings of different studies;
- limited range of variables — most case studies, for example, do not collect information on a displaced worker's earnings pre-displacement and post-displacement;
- limited time series information — most case studies collect information on a displaced worker's labour force status only at one (or two) dates following displacement. Hence, it is not possible to properly analyse the effect on a displaced worker's probability re-employment of time-varying explanatory factors (an exception is Weller 1998); and
- availability of data — the data from case studies are generally unavailable to other researchers.

## 12.5 Policy issues

This section presents a framework for thinking about policy issues relevant to displaced worker, and a brief summary of existing research on these policy issues. This focus on displaced workers again represents a partial equilibrium approach. It is important to be aware however that design of policies for displaced workers is only one aspect of what should be the general objective of policy-makers seeking to deal with labour market adjustment issues. The overall objective for policy-makers should be to have policies which allow adjustment to occur in an efficient and equitable manner. As well as dealing with adjustment issues for displaced workers, policy-making should therefore also be concerned with other issues such as ensuring that there is an available supply of workers with appropriate skills to fill new jobs created by microeconomic reform.

### 12.5.1 Implementation of microeconomic reform

One important issue concerning labour market adjustment and design of policies for microeconomic reform is the optimal timing of policy implementation. Suppose that a policy-maker has several different types of microeconomic reform planned (eg deregulation of a product market, tariff reductions and reform of industrial relations legislation). A first question about timing is whether all reforms should be introduced simultaneously or whether there is some optimal sequence in which to implement these policies. A second question is over what length of time each type of reform should be implemented.

Answering both these questions seems to involve taking into account a similar type of trade off. On the one hand, it might be argued that introducing all types of reform simultaneously, and implementing each reform over the shortest possible time period, will lead to efficiency gains from the shift to the post-reform resource allocation state with higher output being realised most rapidly. On the other hand, this approach to implementation of microeconomic reform is likely to maximise labour market adjustment costs. For example, consider the case of tariff reform. Here the policy choice might be whether to implement a tariff reduction of 10 per cent in one step or in two steps. The one-step method will concentrate the same aggregate amount of job destruction over a shorter time interval than the two-step method. Therefore, with the two-step method, which distributes the job destruction over a longer time interval, workers who lose jobs will at any time be competing to find new jobs with a smaller number of other unemployed persons. Therefore, it might be expected that the average time to re-employment for a displaced worker will be lower under the two-step than one-step method. This argument is supported by case study evidence which suggests that the probability that a displaced worker is re-employed decreases with the number of workers displaced in a plant closure. Of course, the benefits of staggered implementation of microeconomic reform may be reduced where firms respond to policies at the time those policies are announced rather than at the time of implementation.

This discussion suggests that the optimal time period for implementing any particular reforms should depend on balancing the speed of realisation of efficiency gains and size of labour market adjustment costs (Leamer 1980). And since efficiency gains and labour adjustment costs are likely to vary between different types of microeconomic reform, the optimal time period for implementing reform must be judged on a case-by-case basis.

### 12.5.2 Regulation of worker retrenchment

A second policy issue involves regulation of the process of worker retrenchment. Two main issues seem to arise here: first, how much notice should be given to workers that they are to be displaced?; and second, what severance payments should be made to displaced workers?

Currently, worker retrenchment in Australia is regulated directly through workplace relations legislation and indirectly through the wage-setting system. First, some states (notably NSW and SA) have enacted legislation which requires (or can be used to require) employers to provide advance notification of dismissal (Social Justice Consultative Council 1992). Second, minimum terms and conditions of employment specified in awards may include provisions relating to minimum notice periods.

Prior to 1984, most awards (federal and state) contained provisions to the effect that 'Employment...shall be terminated by a week's notice on either side given at any time during the week or by the payment or forfeiture of a week's wages as the case may be' (Creighton *et al.* 1993, p. 225). The Termination, Change and Redundancy (TCR) Test Case decision handed down by the Federal Conciliation and Arbitration Commission in 1984 however provided a stronger set of conditions governing worker retrenchment which could henceforth be included in awards. These conditions specify minimum requirements for advance notification of retrenchment, severance payments, and other employer obligations such as providing time off for job interviews.

Incorporation of these TCR Test Case conditions into awards seems to be far from complete. Pearce *et al.* (1995, p. 20) report that in 1990 only 25 per cent of federal awards included provisions from the TCR Test Case. Moreover, it is important to note that the redundancy conditions from the TCR Test Case do not apply to employees with less than one year's continuous service, where an employer can demonstrate incapacity to pay, and in some circumstances, to employers who employ less than 15 workers. On the other hand, there are other groups of employees, such as public sector employees for whom redundancy conditions are specified in special legislation regulating public sector employment, who have much stronger notice provisions than those specified in the TCR Test Case.

Advance notification of retrenchment is intended to provide displaced workers with a more lengthy period of job search and hence to reduce labour market adjustment costs and to improve job matches. Recent international evidence however suggests that advance notice provisions have little effect on the length of non-employment spells of displaced workers. In particular, there seems little benefit from providing notice more than two months prior to displacement (Fallick 1996, p. 13). One possible explanation for the limited effect of advance notice is that worker search behaviour is not affected by that notice.

Severance payments to retrenched workers have a number of potential benefits: to allow a longer period of job search and hence better job matches for displaced workers; to provide part of an optimal insurance arrangement between a risk-neutral firm and risk-averse workers (Kahn 1985); and to improve equity. On the other hand, the necessity of making severance payments to displaced workers may reduce firms' incentives to make adjustments to labour inputs.

### 12.5.3 Assistance for displaced workers

#### *Social security payments*

Displaced workers who are not in employment are eligible for unemployment benefit payments. Receipt of unemployment benefits may be subject to a waiting period which may depend on the size of severance payment received by the displaced worker, and an activity test (Commonwealth Department of Social Security 1996).

Unemployment benefit payments perform similar roles to severance payments: to finance a longer period of job search activity; to provide an insurance mechanism; and to achieve equity goals. The main potential disadvantage of unemployment benefit payments is that job search incentives of displaced workers may be reduced by receipt of unemployment benefits. This raises the issue of whether alternative benefit systems which also guarantee a minimum income to displaced workers but with a smaller adverse effect on job search incentives, might be considered. Examples of alternative systems would be 'workfare' where receipt of benefits is conditional on a period of work activity; and an earnings subsidy system (see for example, Besley and Coate 1992 and Snower 1994).

#### *Labour market programs*

Labour market programs fall into two categories. First, there are *general programs* which are available to all (or most) unemployed persons. Under the Coalition government, a substantially modified framework for implementation of labour market programs has been introduced. Two main types of service providers now exist: a Service Delivery Agency (SDA) and an Employment Placement Enterprise (EPE). The initial contact point for an unemployed person will be a SDA. The system of SDAs has been created by combining the current Social Security network with elements of the Commonwealth Employment Service (CES). The SDA provides self-help job search facilities and will assess and refer eligible unemployed persons to the second type of service provider — the EPE. EPEs will provide three main types of services — labour exchange services, job search assistance, and intensive employment assistance. A competitive employment placement market has been introduced in the form of a corporatised agency formed from the CES that will compete with private and community-based EPEs to provide employment placement services (Commonwealth DEETYA 1996a).

Second, there are *targeted programs* such as, Labour Adjustment Packages (LAPs) for workers displaced from industries or enterprises undergoing adjustment (such as the textiles, clothing and footwear industry; passenger motor vehicle industry; Australian National Rail; and the native forest industry), and Regional Employment Strategies which aim to improve employment opportunities in regions affected by structural adjustment of industry (Commonwealth DEETYA 1996b, pp. 134–137).

Labour market programs are intended to improve the employment prospects of unemployed persons and hence enhance efficiency and equity.[9] Consider the example of programs which provide extra information about job opportunities to unemployed persons. Suppose that this information allows unemployed persons to find new jobs more quickly. Then there will be two potential efficiency benefits. First, there will be the direct benefit of increased output from the more rapid job matching. Second, to the extent that the improvement in job matching reduces labour market bottlenecks and therefore lowers inflationary pressures, there may also be an indirect benefit — that the economy can operate at a higher rate of economic growth. Equity benefits of the program derive from the distributional consequences of matching unemployed persons to jobs more quickly.

A number of issues arise in assessing the role of labour market programs for displaced workers:

- Do all displaced workers require adjustment assistance?

Case study evidence suggests that older displaced workers may exit the labour force rather than seek employment. For these workers, adjustment assistance will generally be of little benefit. Of course, displaced workers may value the assistance for its general benefits. One example would seem to be workers from a non-English speaking background from the textile, clothing and footwear

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9 See Chapman (1997) and Webster (1997) for recent reviews of labour market programs in Australia.

industry who undertook LAP English language training and then withdrew from the labour market (Industry Commission 1997a, p. 159). The issue then arises of whether these workers should be eligible for some type of alternative compensation from government, or alternative eligibility conditions for benefits such as old age pensions.

- Are specific labour market programs for displaced workers necessary?

As displaced workers are eligible to participate in general labour market programs, some rationale is required for introducing programs targeted at displaced workers. The main reasons for thinking that specific programs for displaced workers are necessary are that general labour market programs might not provide sufficient assistance to displaced workers in situations where a large number of workers are retrenched in a small size labour market, or that the characteristics of displaced workers are likely to make them particularly disadvantaged in seeking employment (Industry Commission 1997b, p. 384). As the number of workers displaced, and their level of disadvantage, is likely to differ between episodes of microeconomic reform, this suggests that the role of targeted labour market programs should be assessed on a case-by-case basis. One problem with targeted programs is that, as a type of sector-specific assistance, they may be more difficult to remove than general labour market programs.

- What types of programs will achieve the best outcomes for displaced workers?

A range of different types of labour market programs are available including job search assistance, training programs, wage subsidies and direct job creation. Existing empirical evidence suggests that these types of programs will differ in their costs and in their effects on long-term employment outcomes of unemployed persons (see for example, Kenyon 1994 and Wesbter 1997).

Without taking up the issue of the advantages and disadvantages of specific programs it does seem possible to make a number of general comments on labour market programs for displaced workers.

First, both demand and supply issues must be addressed in order to improve employment outcomes for displaced workers. That is, not only is it necessary to ensure that displaced workers have job-relevant skills, but as well, there must be available job opportunities which match with those skills. One difficulty with ‘supply’ is that displaced workers often live in regions with poor employment opportunities. In this case, an important aspect of government policy must be to either provide incentives for regional mobility, or to target employment creation programs at a regional-level. It has often been argued, for example, that taxes on home purchases provide a significant disincentive for regional mobility

(Industry Commission 1997b, p. 378). Case study evidence which finds that displaced workers who own a home are much less likely to shift regions to find a new job supports this contention (see for example, Moleta 1984, p. 194 and Curtain 1985, p. 35).

Second, displaced workers are heterogeneous. Hence, different programs are likely to be required for different types of workers. As an example, several case studies find that blue-collar and white-collar labour markets differ markedly in the way that employment positions are filled. Whereas white-collar jobs are most likely to be obtained by displaced workers through newspaper advertisements, the main method for finding blue-collar jobs is through friends and relatives (see for example, Curtain 1985, p. 34, Deery *et al.* 1986, p. 179 and Carless 1986, p. 18).

Third, displaced workers must be aware of the types of labour market programs which are available. It appears that awareness of labour market programs is greatest where displaced workers are provided with information on those programs prior to the date of retrenchment, and where information is provided on several different occasions. Provision of information to workers from non-English speaking backgrounds is also an important issue.

## 12.6 Conclusion

Labour market adjustment issues and analysis of displaced workers should be an integral part of the development of policies for microeconomic reform in the Australian economy. From a theoretical perspective the relevance of the process of labour market adjustment derives from its potential welfare effects in the economy, and from the role of displaced workers in formation of policies for microeconomic reform. Available evidence on the experiences of displaced workers suggests that labour market adjustment issues should also be regarded as an empirically relevant aspect of microeconomic reform. About 5 per cent of workers are displaced from employment each year in Australia. A significant proportion of those workers will experience some spell out of employment, and a relatively large fraction will also spend a long period of time out of employment.

Economic theory and the available evidence on the experiences of displaced workers therefore indicate that labour market adjustment issues need further attention in the design of policies for microeconomic reform. However, one problem is that at present there is little empirical evidence which relates directly to workers displaced from employment by microeconomic reform. Since the types of workers displaced by some types of microeconomic reform may differ greatly from the types of displaced workers covered by existing case studies, this absence of direct evidence represents a significant gap in knowledge.

How might we get better data to assess the labour market adjustment consequences of microeconomic reform? Two approaches seem possible.

One is to undertake an Australian version of the United States Displaced Worker Survey (DWS). This survey is a supplement to United States Current Population Survey (CPS). This survey begins by asking whether a person ‘during the last 3 calendar years lost a job because his/her plant or company closed or moved, his/her position/shift was abolished, insufficient work, or another similar reason’. It then proceeds to ask a range of further questions of displaced workers relating to: reason for job loss; characteristics of employment in job from which were displaced (eg. industry, earnings, and tenure); duration of non-employment before obtaining next job and sources of income during period of non-employment; and characteristics of current job (where applicable). This information can be matched to other questions on the main Labour Force Survey (LFS) — relating for example to the displaced worker’s age and education.[10] (One improvement on the United States survey would be to introduce a control group of non-displaced workers from whom historical and current information on employment status and earnings could be collected.).

Another is to undertake targeted case study analysis — the case study approach involves collection of data for a number of cases of plant/company closure or down-sizing where the reason for closure is related to microeconomic reform (eg. closure of government agency or department; or plant closures in industry sectors where tariff reductions have occurred). Displaced workers would be surveyed at the time of displacement and at several dates after displacement. Information would be collected on workers’ characteristics, the characteristics of the job/firm of each displaced worker, and the employment status/earnings of each worker following displacement. Each case study would follow the same methodology to allow comparisons. An example of this type of approach to case study analysis is the Ontario Ministry of Labour Plant Closure Survey (see for example, Crossley *et al.* 1994).

[10] Further information on the United States Displaced Worker Survey is available at: ‘http://www.bls.census.gov/cps/dispwkr/1996/sqestair.htm’.

## Appendix: Details of case studies

1. Hunter Regional Council (1977) — Ship-building workers – Newcastle – Plant down-sizing – 1976–77 – 530 workers .

2. Department of Employment and Youth Affairs (DEYE) (1979) – Whaling station workers – Cheynes Beach Whaling Station, Albany – Plant closure – 1978 – 96 workers.

3. Connell and Martin (1980) — Timber processing workers – Stawell – Plant down-sizing – 1978 – 73 workers.

4. Connell (1981) — Electronics manufacturing workers – Albury-Wodonga – Plant down-sizing – 1977–78 – 112 workers.

5. Portland Social Planner (1981) — Meat processing workers – Portland – Plant closure – 1981 – 687 workers.

6. Ireland (1983) — Motor vehicle assembly workers – GMH Plant, Pagewood – Plant closure – 1980 – 84 workers (12 per cent of all retrenched workers).

7. Moleta (1984) — Meat processing workers – Tenterfield Abattoirs – Plant closures – 1981 – 478 workers (87 per cent of all retrenched workers).

8. Curtain (1985 and 1987)/Curtain and Hopkins (1986) — White goods manufacturing workers – Email Ltd, Sydney – Plant closure – 1982 – 272 workers (78 per cent of all retrenched workers).

9. Kriegler and Sloan (1986) — Clothing manufacturing workers – Sterling Clothing Co, Geelong – Plant closure – 1985 – 106 workers (75 per cent of all retrenched workers).

10. Carless (1986) — Paper mill – Ballarat – Plant closure – 1986 – 58 workers (26 per cent of all retrenched workers).

11. Deery *et al.* (1986) and Dowling *et al.* (1987) — Brewery workers – Tooth Brewery, Victoria – Plant closure – 1982 – 98 workers (50 per cent of all retrenched workers).

12. Wooden and Sloan (1987) — Confectionary manufacturing workers – Rowntree Hoadley, Adelaide – Plant closure – 1984 – 106 workers (88 per cent of all retrenched workers).

13. Brown *et al.* (1989) — Ship construction – Williamstown dockyard – Plant down-sizing – 1986 to 1988 – 331 workers (33.6 per cent of all retrenched workers).

14. Dunn and O'Neill (1992) — Ship construction – Newcastle dockyard – Plant closure – 87 workers (20.7 per cent of all workers).

15. Pearce *et al.* (1995) — NESB immigrant workers – Sample of workers obtained from advertisement in local media, through ethnic clubs etc. – Workers retrenched since mid 1980s – 120 workers.

16. Weller (1997 and 1998) — Textile/Clothing/Footwear workers – Sample of retrenched workers who had registered with the Commonwealth Employment Service – 1993 – 1640 workers.

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## Discussant — *Don Siemon*

I found Jeff Borland's paper to be a useful and systematic framework to help us think about what is known, what we might be able to find out, and what we might be able to do about the situation of workers who are displaced as the result of microeconomic reform.

Given this, I thought it might be most helpful to offer some further comments on two aspects of the paper:

- the notion of adjustment costs; and
- the ways in which we can best assist displaced workers.

Being very aware of the risks of 'do it yourself economics', I nevertheless hope that these comments coming from outside the profession are of value.

### Adjustment costs and compensation

One thing which struck me after reading the Borland paper was the disappearance of the notion of 'compensation' from discussions about microeconomic reform.

It used to be commonly explained that if a reform was improving efficiency — producing an outcome closer to a social optimum — then the result would be an increase in income which could be used to compensate any losers from the reform. In practice, this seemed to be hard to do; there was the risk of misuse and practical difficulties about capturing the benefits to use for compensation. And learning from this, non-government welfare organisations have been cautious about the idea of changes with regressive elements being ameliorated by compensation. For example, for this reason among others ACOSS (1997, p. 11) has stated that it does not want to see a tax mix change with people living on low incomes being compensated for the regressive impacts.

There are still examples of compensation around, of course. At the level of the firm, there are redundancy payments. At the intergovernmental level there are the national competition policy payments from Canberra to the states.

But by and large, compensation is rarely talked about. It has given way to the notion that the losers should be satisfied by being the beneficiaries of the 'rising tides' of economic growth. This may also reflect the idea that losers really do not have any claim since their losses are merely privileges to which they were never properly entitled and that reform is merely moving the situation back to its 'natural state', as it were.

## Adjustment costs overlooked

But the disappearance of compensation as part of the microeconomic reform debate has one major downside. It allows decision-makers to pay far less attention to the adjustment costs of change, the focus of this paper.

Some parts of the microeconomic reform agenda have been explained to the public using ‘pain now, gain later’ explanations. This rhetoric may exaggerate the extent to which this is a characteristic of the agenda as a whole, but certainly some elements do involve an immediate regressive impact justified by the (less definite) promise of benefits in the longer term.

Take for example, changes recommended to the way in which water and related charges are levied — doing away with rates on properties and instead charging by measure. The claim has been that use of water will thereby become more efficient. But changes to water pricing in Victoria in this direction have had a significant regressive impact — overall, recent beneficiaries have been wealthier home owners, while losers have been less wealthy tenants. The absence of the notion of compensation from the public discussion — to the extent that there has been *any* discussion — has allowed the Victorian Government to show little interest in even moderating the effects of these changes.

Although the relevant Minister set up a consultative committee specifically to assist Cabinet to develop ways in which the existing concession system for rates and water charges could be modernised in line with Government pricing policy, the report (VCOSS 1996) has never been graced with a response from the Government. None of the very modest protective measures proposed, which would have cost a few million dollars and ensured only that concession card holders were protected from large real increases, have been implemented.

The Government did recently find around $130 million to give to all households as a $60 ‘winter power bonus’ by contrast.

My point is not to whinge at the dominance of political considerations in such processes but simply to wonder what would have happened if the reforming policy makers took the notion of compensation more seriously again.

## Some gratuitous comments

The discussion at this conference over the past two days leads me to wonder whether the disappearance of the notion of compensation from public discussion also reflects a lower degree of confidence in the ability of analysts, let alone policy-makers, to discern concrete benefits from reform — let alone work out how to capture them.

This leads me to highlight two points previously touched on by other speakers.

It seems to me that the microeconomic reform agenda too readily *shifts focus from areas where large and obvious gains exist to ones where the gains are far more speculative*. For example, introducing a clear marginal price signal for water may be far more important than full ‘user costing’. Pointing to the costs of artificial institutional boundaries between water authorities may be far more important than issues of ownership. Removing strikingly bad practices may be far more valuable than seeking to impose a whole new order of industrial relations.

This is not just a matter of diminishing returns but of escalating risk. More radical and heroic ventures may produce, for whatever reasons, outcomes which are far from those desired. If governments, in practice, keep messing up reform and making the situation worse or no better, then what is the point of pursuing ‘first-best’ reform?

The label ‘microeconomic reform’ *is often used to pursue other agendas*. I would highlight two elements visible in Victoria. One is ‘reform’ which is really budgetary cost-shifting, not just between governments but also onto households. The second is ‘reform’ which is really just bureaucratic change — for example, grand schemes to reorganise human services which are more to do with departmental agendas than a clear vision of what is to be improved and why. The former is usually very regressive; the latter involves major waste.

## Assisting displaced workers

From the point of view of Australian living standards, we should obviously be concerned when workers are displaced through microeconomic reform if this leads to their unemployment.

We should not of course be blind to what happens to the workers that are left in the industry. Certainly, they will have a job. But it is possible that the job may be a worse one. To be scrupulous in our judgement on efficiency benefits, we should be examining not just productivity and pay rates but the degree of work intensification and changes in working conditions.

But clearly the unemployment of the displaced workers is the more pressing concern, for three reasons. First, there are the *direct impacts of unemployment*: on the people involved, on their family and sometimes whole communities. Some of these impacts are less quantifiable — for example, on the lives of children. Some are obviously costly — unemployment costs governments over $20 billion a year.

Second, there is the *risk of these people being excluded from further employment*. Our experience in providing employment assistance to these people, and the findings of other research, is that their poorer job chances may be partly a result of selection — the least competitive may be more likely to be laid off. But they are also to do with their age, their skill mix, the extent to which unemployment erodes both these skills and their confidence and the discrimination faced by people who have been unemployed for long periods.

Borland’s paper summarises some case studies (section 4c of the paper), examining the likelihood of displaced workers gaining employment and the length of time for which they were unemployed. The factors emerging here overlap strikingly with findings from employment programs (eg MacDonald 1995) about what helps get disadvantaged people back to work — the extent to which there are surrounding job opportunities, either in the geographic region or the industry sector in which training and work experience takes place as well as age and education.

The third reason for being concerned about the displacement of workers in microeconomic reform is the extent to which it feeds into the structured inequality of opportunities in Australia. One economist put it to me recently: ‘What’s the point of all this worrying about efficiency if all the gains are getting captured by the people at the top?’.

We need therefore to be very careful about the way we structure our public institutions to ensure that we have more, not less, in the way of efforts to expand opportunity. We have to think very carefully about what this means for changes to our education system and our health system as well as more direct areas such as employment services.

At this point the news is pretty mixed. In education, for example, there are new welcome initiatives in the area of early literacy and assisting teenagers in school to work transitions. On the other hand, schooling costs are driving more people to seek emergency aid from welfare organisation, discouraging parents from strong bonds with the school and funding cuts have left vulnerable students without the support of student welfare officers. In Victoria, we are seeing far less of our GDP going to education, creating an enormous gulf between community aspirations and government support which cannot be filled.

## How to assist

A key way to assist the casualties of change is through ensuring their reemployment. The Brotherhood of Saint Lawrence has been heavily involved with services to this end for many years.

I agree with Jeff Borland's argument that there is a case for specialised programs for workers displaced as a result of major microeconomic reform efforts. In times of high unemployment, of course, there is more likely to be a sense that these workers should be left to queue for assistance along with everyone else. But it may well be better to construct programs at an exit point to minimise their long-term unemployment.

How useful can such programs be? Our experience is that they do work and make a difference. Whether the new system for employment services in Australia will be as successful remains to be seen. It moves from funding programs to funding budget-holders to achieve outcomes. This offers the possibility of more individualised patterns of assistance — provided of course that the resources are really there and the funding is sufficient. Achieving this will be the major challenge faced by non-government agencies contracting with the Commonwealth for this purpose.

Our experience and research suggests that there are a number of key elements which will have to be present for assistance to be of value:

- choice — unemployed people must be able to choose who and how they wish to be assisted;
- supervision — good supervision in workplaces during work experience or on-the-job training is essential for personal and vocational support;
- links to ongoing job prospects — training must be relevant to employment needs and must develop marketable skills;
- building on existing skills and aspirations — assessment prior to training is essential;
- accredited and recognised training — formal acknowledgment of skills acquired or held is important for future employers;
- attuned to needs of individuals — some participants who have been out of work for long periods may need longer to complete training. Some people will have complex emotional, personal and housing needs which require support if training is to be completed;
- income — employment programs should alleviate not compound financial hardship; and
- post-placement assistance — support following the completion of the program helps people make the most of it in subsequent job search.

## Conclusions

The consequences of microeconomic reform are not just narrowly economic. They involve changes to people's lives which, even if they are transitional effects, need wider attention. They make it essential not only that the microeconomic reform agenda is in itself directed to the public good, but that our other social institutions — health, education and particularly employment services — are directed to good effect.

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## **Discussant** — *Michael Gadiel*

Being from the Labor Council of New South Wales, naturally I suspect my role here is to speak on behalf of those displaced workers that arise from microeconomic reform initiatives, and I suppose define what might be the role of the trade unions in these matters. The role as I see it, would be to make sure that the winners in any micro reform process sufficiently compensate the losers in that process, such that the losers feel that they are adequately brought in and committed to that process occurring. The failure in that occurring can often lead to a deceleration, a stalling of the microeconomic process itself.

Briefly, the union movement seeks to ensure that the winners compensate the losers in four main ways: the first is to negotiate redundancy or severance arrangements for displaced employees. The second — and as was raised in the paper, it is older employees who have more difficulty in obtaining re-employment — in ensuring that older employees who are displaced are better compensated than others. The third is to lobby for specialist labour market reforms; and the fourth is to encourage government authorities or private companies to invest in out-placement services or specialised labour market programs for the individuals affected.

Unfortunately, when microeconomic reform is attempted, it is very frequently the unions which are seen to be opposing it or are opposing it. Recent examples can be seen in the free-trade protectionist debates involving the textile and footwear industry and the Textile, Clothing and Footwear Union, in the protection issue regarding the car manufacturing industry, the Australian Manufacturing Workers Union (AMWU) vehicle division, the closure of BHP Newcastle involving the Australian Workers Union (AWU) in Newcastle, the privatisation of the power industry in New South Wales involving the Electrical Trades Union and the Municipal Employees Union, and the recent and current debate regarding the parallel imports of CDs involving the Media, Entertainment, and Arts Alliance. In all these cases, it is the union which is one of the main bodies opposing such microeconomic reform.

There are elements within the union movement that are aware — the union movement being a broad movement — that although very often the losers in these reforms are identifiable and specific to one union, very often the union movement as a whole will benefit from a successful microeconomic reform in any particular area. Reflecting the interest of the movement in reform, the Labor Council has been very much involved in some of the public reforms in New South Wales. Nevertheless, I can name two specific examples where we have seen microeconomic reform either fail or stall as a result of an inadequate compensation of those people who would be the losers in that process, specifically the workers involved.

The first example is the Rail Services Authority (RSA) in New South Wales. This authority is publicly owned and soon to be corporatised. It employs those in the rail industry who service and maintain the rail infrastructure. Last year, the government opened up that industry to competitive tendering. From the outset, the RSA or the government-owned body did not win a single tender, resulting ultimately in the recent government announcement that competitive tendering for rail maintenance would be halted for 15 months. This is an example of a situation where the inability of the government to compensate sufficiently the losers in that reform process resulted in the ultimate stalling of the process itself.

A second example is perhaps the New South Wales power industry, where the New South Wales government has been unable to convince the unions and the employees involved of the benefits that would arise from privatisation of the power industry.

In both of those cases, potentially a lack of generosity I guess, or a lack of thought regarding the effects on displaced workers, and a lack of will to compensate those employees adequately, has led to a failure of the policy itself.

So in summing up, we see as a trade union movement great benefit in exploring further the effects on displaced workers of microeconomic reform, how those effects can be lessened and the mechanisms by which those workers can be put back into the workforce in a useful way. The union movement understands that as a movement overall we often benefit from microeconomic reform, although there are identifiable subsections within our movement that are greatly affected. I thank everyone for involving us in the Workshop, and we look forward to further study in this area.

## General discussion

The discussion focussed on the following themes:

- the relative importance of real wage losses and unemployment in adjustment costs;
- revealed preference measures of adjustment costs;
- job churning; and
- methodology.

### Adjustment costs

There was some debate about whether spending time out of work or the foregone wages were more important in determining the cost of adjustment to microeconomic reforms. One participant suggested that time spent unemployed was the more important factor, because there is very good evidence that the longer you spend unemployed the less likely you are to find work. Borland agreed that if you looked at the case study evidence for Australia, this was so. However, he noted that there was other evidence on displaced workers emanating from the United States and Canada that suggested that, in terms of lifetime income, the average wage loss can be fairly substantial.

Another participant expressed the view that the skill level of marginal workers was an important factor. For instance, as rationalisation occurred in the steel industry, low skill workers may not have had the necessary expertise to find jobs in expanding activities that may have required higher (different) levels of technical expertise. There is now a lot of evidence suggesting that skilled labour is complementary to high technology capital. An important way of reducing adjustment costs, therefore, may be to implement skill enhancement programs.

### Revealed preference measures of adjustment costs

In a number of industries that have been undergoing rationalisation, voluntary redundancy packages have been offered to employees. Some of these packages have been more generous than others. One participant reflected that it may be possible to obtain an estimate of displacement and adjustment costs by observing responses to the various different voluntary redundancy packages. Such estimates, however, would have to be used with care, since there is a fundamental difference between voluntary redundancy and retrenchment — the latter not being voluntary — but they may provide a lower bound to adjustment costs. The comment was made that it is not uncommon to see a low acceptance rate for even very generous voluntary redundancy packages, suggesting that adjustment and displacement costs may often be large.

### Job churning

Concern was expressed about the focus of attention with respect to displacement costs. It was noted that, while some microeconomic reform processes could not continue indefinitely, the phenomenon of job churning — that is, moving into and out of the workforce — is a continuous process. The suggestion was made that, rather than focussing solely on the groups directly affected by reforms, attention should be paid to the issue of job churning as a whole.

### Methodology

One participant queried the direction of causality between productivity, real wage growth and redundancies. On one hand, there may be the presumption that productivity growth was taking place and that had been incorporated into real wage growth in redundant employees' previous jobs. This presumption may then have led to the loss of employment by some. On the other hand, the validity of this presumption was questioned, as any productivity improvements may have been caused by the reforms which led to the retrenchment of the employee and subsequent real wage increase. In this case, if the employee had kept the particular job, the real wage may not have risen. Jeff Borland responded that his analysis was only designed to illustrate the three types of adjustment costs and should be interpreted in that context. He also noted that there was evidence from the United States suggesting displaced workers had been experiencing real wage declines for a couple of years before they lost their jobs. Jeff Borland expressed the view that the main point was that, in order to get the welfare economics right, it was necessary to pay attention to adjustment costs.

# PART E:  SUMMING UP

# 13 A SUMMING UP

*R. G. Gregory*

## 13.1 Introduction

Why are some nations richer than Australia? This question goes right to our poor understanding of the long-run growth process and is not an easy question to answer. Despite our uncertainty as to why income growth rates vary across countries, and change radically over time, there is no doubt that productivity growth plays a central role in the creation of wealth and income. If there are to be substantial improvements in average living standards in the long run there must be substantial improvements in productivity.

What can government do to increase the productivity growth rate? Will a faster rate of microeconomic reform make a significant contribution? Are some microeconomic reforms better than others and are there general principles that a reform program should follow?

In thinking about issues of microeconomic reform and productivity growth, we are continually reminded of the problems of productivity measurement and establishing links between policy actions and growth. These issues are introduced early in this volume (Banks and Morrison) and are recurring themes in the later chapters.

The contributors to this volume have been thinking about these issues for some time and their chapters make interesting reading. They are all supporters of microeconomic reform but well aware of the difficulties of measuring short-run costs and benefits, well aware that benefits increase and costs diminish through time and well aware that some reforms will be more successful than others. There is a good balance of papers. Given the general support for microeconomic reform these comments are not comprehensive and focus more on the controversial issues.

## 13.2 The production function, multifactor productivity and the rate of income growth

Almost all papers presented were based on the assumption that a production function is an appropriate tool to analyse the effects of microeconomic reform.

The first well known empirical application of a macro production function was by Robert Solow in his famous 1957 article.[1] Solow used a production function to model the growth process of the non-farm private sector of the United States. He assumes a Cobb-Douglas production function and differentiates it with respect to time and derives:

$$y = \gamma + \alpha l + \beta k \tag{13.1}$$

where $y$ is the rate of growth of output, $l$ the rate of growth of labour and $k$ the rate of growth of capital. The coefficients $\alpha$ and $\beta$ are the labour and capital share in output. Multifactor productivity, which is the rate of growth of output after subtracting the rate of growth of a weighted sum of the measured inputs, is measured as $\gamma$. Assuming constant returns to scale equation (13.1) can be rewritten in terms of the rate of growth labour productivity as:

$$(y-l) = \gamma + \beta(k-l) \tag{13.2}$$

where the rate of growth of labour productivity, $(y-l)$, depends on multifactor productivity, $\gamma$, plus the difference in the rate of growth of capital and labour, $k$-$l$, weighted by the capital share of income, $\beta$. It is apparent from equation (13.2) that labour productivity and multifactor productivity growth rates are identical if capital and labour growth rates are the same, that is, the capital-labour ratio does not change. This is the assumption that many writers make when they interchange multifactor and labour productivity in their analysis. Even when the capital and labour growth rates differ, the gap between multifactor and labour productivity is not large because the growth rate difference between capital and labour is weighted by the capital income share which is quite small — usually between 0.3 and 0.4.

Solow shows, in terms of labour productivity growth, that over 90 per cent of the increase in the living standards of United States citizens over the 1909 to 1949 period can be explained by $\gamma$, the growth of multifactor productivity. Accumulating more capital per person was relatively unimportant. This came as a great surprise. After all, most of us believe that saving and accumulating capital is the way to higher levels of personal income. But, in an important sense, the essential question of what determines the rate of growth of income remains largely unanswered. It may be a step forward to demonstrate that capital accumulation and saving are relatively unimportant but it is still not known what determines variations in $\gamma$. This point is underlined by the fact that $\gamma$ is sometimes called the 'residual' or the 'measure of our ignorance' of the

1 Earlier articles are by Tinbergen (1942) and Lomax (1950).

growth process.[2] As we will see it is often assumed *a priori* that an increase in microeconomic reform will increase $\gamma$.

The Industry Commission (1997) applied the Solow methodology to Australian data and estimated that over the last three decades multifactor productivity, or the "measure of our ignorance", accounted for around two thirds of the rise in per capita real income; a result not very different from that of Solow.[3]

The more recent Australian production function studies are surveyed by Dawkins and Rogers (Chapter 7). Among their more important points are the following:

- there was a significant slow down in labour and multifactor productivity growth during the 1980s. Some of the fall in labour productivity growth was associated with a falling capital-labour ratio;
- despite this slowdown, Australian multifactor productivity growth since 1979 has proceeded at approximately the same rate as the OECD average (OECD 1997);
- there has always been a persistent best practice productivity gap between Australian and overseas industries and there is no significant evidence that this gap is closing;
- productivity growth is very fast in a few industries — manufacturing, transport, storage and communications — and negligible in others — construction, wholesale and retail trade, and real estate;

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2 Attempts have been made to explain the 'residual' and to investigate further whether the Solow methodology underestimates the importance of capital accumulation. Formulations of the growth process were specified in which new technologies needed new capital to be effective. In these models, an increase in the savings rate and the growth rate of the capital stock would increase the adoption rate of new technologies. The macro performance of these 'vintage' capital models, however, was not an improvement on the Solow model.

Economists then turned their attention to the changing levels of labour quality, usually measured by education attainment. This formulation would also increase the importance of saving and capital accumulation, only savings would be directed towards education and investment in human capital. Although these models met with some success they also were not a noticeable improvement on the Solow model.

More recently, new growth models have begun to emerge to throw light on the sources of the residual. These models stress a range of factors such as the openness of the economy, public infrastructure and the education level of the workforce. One factor is the institutional, legal and competitive framework within which firms operate; the very things that microeconomic reforms attempt to change. An example of this approach can be found in Chapter 8 by Chand, McCalman and Gretton.

3 For a contrasting view of economic growth in Asia see Krugman (1997).

- although productivity growth rates are very different across industries the average productivity growth of the economy is not significantly affected by resource reallocation across industries; and
- there is a presumption that increased competition in product and labour markets will increase productivity growth.

Dawkins and Rogers suggest topics for future research and the Workshop proceedings quite clearly supported their suggestions. As the Workshop proceeded, however, the list of topics to be pursued became longer and extended into the effectiveness of regulation (King) and the mechanisms whereby micro reform affects the macro productivity growth rate (Easton).

The production function methodology is not the only analytical framework that might be applied to estimate the gains that might flow from microeconomic reform. Other techniques involve focussing on best practice outcomes for other countries, trying to explain the gap between them and Australian outcomes, and the measurement of the size of Harberger triangles (see Morrison and Freebairn). These techniques were not discussed to any significant extent. The relative importance of allocative and productive efficiency gains from reform drew quite a lot of attention during the Workshop. In part this reflected the well established theoretical literature on these issues and a concern that when put to the test allocative efficiency gains from individual reforms are often modest. What was more surprising, was that the importance of new goods — the Dupuit effect — on growth did not receive more emphasis (Romer 1994, Dowrick 1994).

Chand, McCalman and Gretton (Chapter 8) apply a production function framework to eight Australian manufacturing industry subdivisions over the period 1968–69 to 1994–95. The simple Solow production function framework does not work well. The *unexplained* component of growth dominates, as is usual, but almost all capital coefficients are statistically insignificant, and while labour coefficients are statistically significant they are often too large. The authors then attempt to explain the ‘residual’ contribution to growth by including in the regression a number of variables measured on an economy-wide basis — public capital, the stock of human capital, intra-industry trade in machinery and equipment, and the value of the stock of research and development — and for each industry the level of assistance to industry.

Changes in these variables lead to the unexplained residual component of growth becoming generally insignificant. The authors find that while some results conform to *a priori* expectations, others particularly related to the contribution of public capital and foreign R&D are difficult to explain. This lead the authors to the conclusion that there are other influences on industry productivity that are not captured by the model adopted. The authors also found that variability in results increased as the analysis was disaggregated from total manufacturing to the industry subdivision level.

The authors stress the role of industry assistance on the *rate of growth* of output and this effect is found to be statistically significant for manufacturing as a whole and in five of eight industries. It is not well understood how tariffs interact with technical progress and economic growth and these results are very interesting.

On another point, the dependent variable is not the rate of growth of constant domestic-price output as is the common practice in single country analyses of productivity growth. The dependent variable is the rate of growth of constant price output adjusted for the assistance level so that the higher the tariff the lower the level of constant-price output. This is done because the authors wish to obtain a measure of output that is independent of the explanatory variable of industry assistance. This is a conceptual development that *prima facie* does not fit in with the underlying production function framework which is conceptualised as an analysis of pure ‘physical’ quantities and I remain uncertain about it.

## 13.3 Multifactor productivity and microeconomic reform

Microeconomic reform could affect employment and capital accumulation but the emphasis at the Workshop was on the relationship between microeconomic reform and multifactor productivity, $\gamma$. It was generally accepted that microeconomic reform should have brought about increases in multifactor productivity over and above that which would have otherwise occurred.

No one questioned that in the *long run* microeconomic reform would contribute positively to multifactor productivity and increase Australian living standards. There was some discussion (Quiggin, Freebairn, Banks, Dawkins and Rogers) as to whether microeconomic reform resulted in a once-off productivity gain, or a permanent change in the productivity growth rate. This is an important analytical point, and an important empirical issue in the long run, but at this time it is very much a side issue. If there was a once off gain in multifactor productivity it would be spread over a few years and, in the short run, it would not be possible to distinguish this gain from a permanent change in productivity growth rates. We need to wait for an answer. Perhaps the answer also depends on the nature of the reform.

There was more debate as to the contribution of microeconomic reform in the *short* run and the data are difficult to read. Many industry studies predicted substantial productivity gains if microeconomic reforms were introduced (Quiggin). In some industries, after reform, there have been spectacular increases in measured productivity but, in many instances, productivity performance has not lifted as much as expected.

In some papers therefore, there is a feeling that short run productivity gains from microeconomic reform may have been oversold. This may be particularly so for New Zealand, where productivity growth rates seem to be lagging again (Easton, Dowrick), and in a number of Australian industries — air transport and electricity generation (Forsyth). Perhaps we should not be too disappointed if, in some instances, a marked lift in total factor productivity has not occurred in response to microeconomic reform. To focus on productivity gains, as measured, may be to adopt too narrow a focus. Morrison (Chapter 2) and Forsyth (Chapter 9) make this clear. There are other gains from microeconomic reform that are not so easy to measure, gains that relate to the pattern of prices, increased quality of service and the faster adoption or development of new products (Ergas, Lowe 1995).

Just as productivity gains may understate the benefits from microeconomic reform there may well be costs that are not captured in productivity measures. In many industries — such as utilities and transport services — the typical form of organisation was public monopolies and microeconomic reform involved the creation of private monopolies. The success of reforms will depend, in part, on the success and costs of the regulatory regimes. Assessing these outcomes is not straightforward. As Forsyth suggests, 'What is emerging is that some regulatory arrangements are very complex. The outcome is not light handed regulation', and it may be that poor regulation may offset some of the potential gains. Poor regulation may take the form of heavy handed regulation that is needed but misguided, heavy handed regulation that is not needed, insufficient regulation and perhaps the capture of the regulator by the monopolist. The interplay of newly created private monopoly power, productivity and regulation is complex (King).

One important point to note is that privatisation of public monopolies has often been advocated in terms of public finance, that is, as a method of changing the asset portfolio of governments to reduce government future income streams (the returns from assets) and future costs (the interest on public debt). Privatisation therefore may not achieve much by way of productivity increases, but it may pose considerable problems for pricing policies, access pricing, and restraint of competition. There may also be a conflict between privatisation and future market liberalisation as the value of the government asset when sold will depend on whether the future environment will allow the new owners to exercise monopoly power to some degree. Again, as Forsyth notes:

> At this point it is not clear what privatisation has contributed to productive efficiency, nor has there been much evaluation of how well governments have implemented privatisation, taking into account the use of proceeds and competition aspects. (Chapter 5)

Once again it seems too soon to make a considered judgement.

One of the good things about this volume is that it is clear that we are becoming more sophisticated in our assessment of microeconomic reform. There is a genuine degree of inquiry and a better understanding of the reform process.

The analysis seems to have gone well beyond what was often asserted by early advocates that all would gain. It seems so difficult to believe that such a proposition would stay intact when confronted with reform outcomes. Activities subject to large tariff reductions must lose. Country towns which were previously subsidised by public utilities must lose. Waterside workers must lose if docks are reformed with substantial decreases in wages, working conditions and employment.

However, advocates of microeconomic reform should not be afraid that some people will lose from the process. If aggregate income increases are significant enough this will more than compensate for short-run losses. The normal working of the economy inevitably involves some people losing and others gaining. A more sophisticated understanding of the actual changes that follow microeconomic reform, and which recognises some of the losses, does not make microeconomic reform unworthwhile. During the discussion Albon asked, 'is anyone advocating that we reverse the microeconomic reform process and return to the previous state of affairs?' No one said, 'let us go back'. The feeling was that we should continue the microeconomic reform process and continue to improve our understanding but be more careful in our appraisals. This volume is a step along that path.

## 13.5 Microeconomic reform and macro outcomes

There was a strong presumption at the Workshop that microeconomic reform would lead to discernible and significant gains in labour and multifactor productivity at the macro level. But, it is important to realise that productivity changes flowing from microeconomic reform of particular industries may not be clearly identified at the macro level otherwise hasty and mistaken judgements may be made as to the success or failure of the reform process. Three of the more important reasons why there may not be an obvious link between microeconomic changes and macro outcomes might be the following.

First, the coverage of microeconomic reform, relative to the economy as a whole, may have been quite small. It is difficult to form a clear view. One of the simplest areas to quantify is tariff reform, but significant reform over the last ten years may have been applied to less than 8 per cent of the economy, or just over half of manufacturing. Even this may be an exaggeration. Within each industry, subject to reform, a significant fraction of production may not have been protected by tariffs.

Second, as discussed by Quiggin (Chapter 4), microeconomic reform has been a continuing process over the last three decades and, in principle, only increases or decreases in the rate of reform should be detectable in terms of faster or slower productivity growth at the macroeconomic level.

Third, many other factors impinge on multifactor productivity and their influence may swamp microeconomic reform effects.

The link between microeconomic reform and macroeconomic productivity growth is very important and worth spending some time on. Although Dawkins and Rogers comment that since 1979 Australian multifactor productivity growth rates have been much the same as the OECD average there does appear to be a change within the period. Australian multifactor productivity growth rates have increased since 1990 and are now approaching the levels of the late 1960s and early 1970s. This augurs well for the hypothesis that microeconomic reform is making a large contribution to increases in efficiency of the Australian economy.

Although productivity growth rates have accelerated over the last six years, the output growth rate has not. Consequently, faster productivity growth has been associated with lower employment growth. Hence, the concern of a few years ago about a ‘jobless recovery’ from the recession and the too optimistic Treasury forecasts of employment growth. Could this faster labour productivity growth be a microeconomic reform dividend?

## 13.6 Australia’s recent productivity acceleration

Dowrick investigates the ‘jobless’ recovery (at August 1997 the Australian employment-population ratio is still below that of August 1989 and August 1990). He confirms that since 1990, and relative to OECD averages, Australian multifactor productivity growth has been faster than expected. Why has this happened? In the context of the study of the twenty-one OECD economies, he finds that the acceleration of multifactor productivity growth is unexplained in the same way that the residual was unexplained by Solow.

One hypothesis is that the increases in the multifactor productivity growth rate is the result of changed labour market institutions that impinge directly on labour and total factor productivity. With respect to the labour productivity growth rate (equation 13.2), it is argued that enterprise bargaining has led to above average real wage increases and, in response, firms increase labour productivity and substitute capital for labour and thus produce sluggish employment growth. However, it is not clear whether the extent of labour market reform is large enough to generate these changes. Sloan (Chapter 11) points out that labour market reforms are less wide ranging than she would prefer and they have lagged behind product market reform.

It is interesting to note that substantial labour market reform may be ambiguous in its impact on labour productivity (see equation 13.2). If labour market reform were to lead to full employment, it may require substantial wage falls for the unskilled. Lower wages, and the substitution of labour for capital, may be important outcomes. In this case microeconomic reform may lead to *lower* labour productivity growth if the factor substitution effects outweigh the effect on multifactor productivity.

### 13.6.1 Is a production function appropriate for short run analysis?

In the *long run*, many researchers have shown that employment and productivity growth are largely independent and the production function framework alone seems a good analytical tool. But over the last two and a half decades, when many OECD economies have operated with substantial unutilised labour, the production function framework in isolation seems less appropriate. It now seems to be important to add further equations to allow for interrelationships between the variables that have been treated as exogenous in the production function framework — labour, capital and multifactor productivity. Indeed, the relationship between the variables on the right hand side of the production function may be more important than the influence of these variables on changes in the rate of growth of output.

Over the last two decades, many OECD European countries have experienced high labour productivity growth and significant job losses. They have a high success rate of increasing productivity but a low success rate of creating jobs. The United States, on the other hand, has experienced significant employment gains but has failed to achieve a significant rate of productivity growth. Both Europe and the United States have experienced very similar output growth rates, after adjustment for population growth. Consequently, employment and labour productivity growth rates across these economies are negatively associated. There is a large literature to explain why the United States, with its slower productivity growth, has generated faster job growth than Europe where productivity growth has been faster. There are calls for microeconomic reforms in Europe, so that they can emulate United States employment outcomes even though these were achieved at a cost of offsetting low labour productivity growth. The basic idea is that if European labour markets were deregulated, labour productivity growth rates would fall in response to wage falls for labour market groups with high unemployment.[4] One of the objectives of microeconomic reform therefore is to reduce the rate of labour productivity growth and increase the rate of growth of employment. Not a great deal of the emphasis is being placed on the link from increased microeconomic reform to increased output growth rates. The emphasis therefore is different from that in Australia. Australian commentators tend to argue that increased productivity growth from microeconomic reform will increase both output and employment growth rates.

### 13.6.2 The Australian experience

This international literature has its counterpart in Australia across different time periods. Consider Table 13.1 which lists the Australian output, employment and labour productivity data[5] for the two periods chosen by Dowrick, the eleven years 1979 to 1990 and the seven years 1990 to 1996.

The first thing to note from Table 13.1 is that there has been a substantial change in labour productivity in Australia between the two periods. In the early period, productivity growth averaged 0.9 per cent per year. In the second period, productivity growth has more than doubled to 2.2 per cent. It is important to note, however, that the GDP growth rate has not accelerated, indeed, GDP growth in the second period is marginally lower. The productivity acceleration has not translated into faster output growth. There is no 'microeconomic reform dividend' in terms of output growth. The accelerated productivity growth has been associated with a lower growth in aggregate hours worked which has fallen from an annual growth rate of 2.1 per cent per annum

4 In the past, labour and multifactor productivity growth have been highly correlated and it is quite usual for commentators, who are well aware of the difference, to interchange the two terms. Microeconomic reform of the labour market is supposed to *encourage* multifactor productivity but may well *discourage* labour productivity growth, so that the relationship between these variables is quite different from the normal positive correlation.

5 Sometimes the analysis and results will change if the beginning and end points of periods are changed. The unemployment rate was 5.8, 7.0 and 8.4 at August 1979, August 1990 and August 1997, respectively. The difference between starting and end points is approximately the same for each period.

to 0.8 per cent. Productivity acceleration and job growth deceleration almost exactly offset each other.

Table 13.1: **Annual average growth in output, employment and labour productivity, Australia and New Zealand, 1979 to 1990 and 1990 to 1997**[a] (per cent)

| | *1979–1990* | *1990– 1997* |
|---|---|---|
| *Australia* | | |
| Aggregate hours worked | 2.1 | 0.8 |
| GDP | 3.1 | 3 |
| Labour productivity (GDP per hours worked) | 0.9 | 2.2 |
| *New Zealand* | | |
| Employment | 0.2 | 1.7 |
| GDP | 2.1 | 1.8 |
| Labour productivity (GDP per person employed) | 1.9 | 0.1 |

a Calendar year basis.
*Sources*: Dx; Australian National Accounts; OECD Historical Series.

The poor employment record since 1990 is even more stark in terms of full-time job growth between the two periods (Table 13.2). In the 1990 to 1997 period, an annual average of three thousand additional full-time jobs were created. In the earlier period the rate of full-time job creation was thirty times greater — an average of ninety-eight thousand per annum. This is an extraordinary difference.

Table 13.2: **Annual average employment growth, Australia, 1970 to 1990 and 1990 to 1997** (thousand persons)

| | *1979 to 1990* | *1990 to 1997* |
|---|---|---|
| Full-time employment | 98 | 3 |
| Part-time employment | 55 | 68 |
| Total employment | 153 | 70 |

*Source*: ABS Cat. No. 6203.0, August (various issues).

In an economy where there is widespread under utilisation of labour, additional employment must be valued highly and therefore, at this stage, nothing much seems to have been gained by the productivity acceleration. Faster productivity growth has been associated with slower employment growth. The productivity acceleration needs to be translated into faster growth of GDP for us all to benefit.

## 13.7 The New Zealand puzzle

Although New Zealand has introduced substantial microeconomic reform, it is one of the worst performers among OECD countries in terms of multifactor productivity growth. Dowrick demonstrates that New Zealand multifactor productivity growth is well below the OECD average for the 1990 to 1996 period (New Zealand is among the bottom six of twenty-one countries.) In addition, New Zealand is among the four worst performers in terms of the change in multifactor productivity growth between 1979 to 1990 and 1990 to 1996. In the earlier period, New Zealand was above the average in multifactor productivity growth of the 21 countries and yet during 1990 to 1996, when microeconomic reforms should be exerting a strong positive impact, the New Zealand performance was well below average. To this point, and despite substantial microeconomic reform, there is no New Zealand multifactor productivity miracle.

From the Australian perspective New Zealand is a very important topic of study, partly because there have always been close links between the economic and social policies of the two countries but, in addition, as Easton comments:

> Economic reform in New Zealand has been unusually comprehensive and thorough. For the scientist it provides a test of the theory which underpinned the reforms. (Chapter 6)

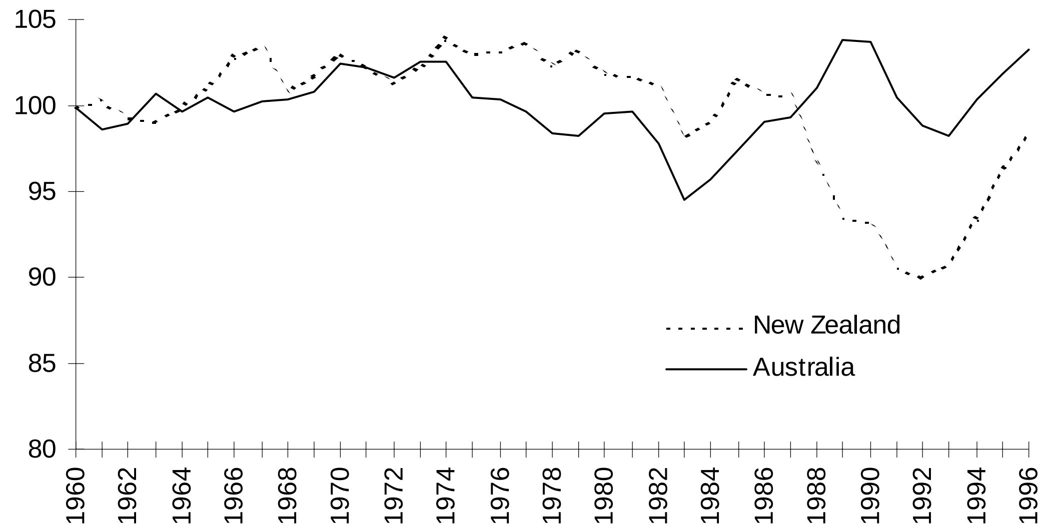
The Easton chapter generated considerable discussion, ranging from those who did not believe the story line *a priori* to those who were prepared to accept the fact of poor New Zealand productivity growth but suggested that substantial improvement will occur in the future (eg Bates). Another suggestion was that in the absence of reforms, New Zealand outcomes would have been worse.

Table 13.1 also presents the New Zealand output, labour and labour productivity data. In the 1979 to 1990 period, New Zealand experienced an annual productivity growth rate of 1.9 per cent. Since 1990, the average growth rate has fallen to 0.1 per cent. This is a remarkable fall and must be of considerable concern to those who wish to link accelerated microeconomic reform to increases in macroeconomic productivity growth. Similar results can be found in a series of industry studies by Fare, Grosskopf and Margaritis (1996) who show a productivity uplift over the 1985 to 1989 period and very little productivity growth since then. They show substantial multifactor productivity falls for textiles, wood, fabricated metal, construction, trade, financing and community services and some spectacular increases for other industries such as forestry, mining and electricity.

There is a further difficulty. The GDP growth rate in New Zealand has fallen during the microeconomic reform process. The average growth rate in the 1979 to 1990 period is 2.1 per cent and falls to 1.8 per cent in the later period. As the output growth has fallen marginally it follows that the extraordinary productivity slow down has been offset by an increase in the employment growth rate.

The New Zealand employment growth is looked at from a different perspective in Figure 13.1 which presents the proportion of the New Zealand population employed and sets the index at unity in 1960. Between 1960 and 1987 the index was essentially constant and as the microeconomic reform process gets underway employment begins to fall quickly, reaching a trough in 1992 and 1993 which is 10–12 per cent below normal employment-population levels. This is the worst New Zealand recession since before the Second World War. Employment begins to recover quickly after the trough of the recession, but by 1997 the employment-population ratio is still below normal levels. The contrast with Australia is interesting. The Australian employment record has been so much better since the mid 1980s.

Figure 13.1: **Ratio of employment to population, Australia and New Zealand, 1960 to 1996** (indexes 1960=100)




*Source*: Dx; OECD Historical Series.

Some of the employment decline is due to tight monetary policy to reduce inflation. This is an important point and it illustrates the earlier comment as to how difficult it is to draw simple empirical links between microeconomic reform and macro outcomes.

On the *basis* of the change in aggregate labour and multifactor productivity, the New Zealand microeconomic reform program seems to have failed. In Australia, using the same criteria the reform program seems to have succeeded. And yet this is not commonly said. The different experience of Australia and New Zealand is worrying. It was argued by some that reforms take time to impact and New Zealand is still waiting for the pay-off. If so, why has Australian multifactor productivity performance improved so quickly, following upon a decade during which microeconomic reforms were not that far reaching. It is easy to see why Dowrick and Banks commented that it is best to remain agnostic. Of course, changes in measured labour and multifactor productivity should not be the only criteria and many participants offered off the cuff remarks on how they believed that the New Zealand economy had improved.

But, perhaps the real puzzle of the Workshop, from a macro perspective, is that in both countries GDP growth rates seem largely unaffected by their microeconomic reform and the main differences occur in negative and offsetting changes in labour productivity and employment since 1990. And the pattern is different. In New Zealand, productivity growth rates have become negligible but employment growth is strong. Australia has experienced large productivity gains but failed to generate jobs.

None of this is to suggest that because employment and productivity growth rates have been negatively correlated, and there has been no acceleration in output growth, that we should turn our back on trying to produce output more efficiently. What it does suggest is that unless faster productivity growth can be quickly turned into faster output growth, it will impact adversely on employment. To date all the productivity gains that may represent a ‘microeconomic reform dividend’ in Australia have been associated with very little employment growth. In New Zealand, the ‘microeconomic reform dividend’ may be found in aggregate employment growth, coming out of the recession, but not from productivity growth or from the accumulated employment growth since 1985.

## 13.8 The effect of microeconomic reform on workers who lose jobs

In Chapter 12, Borland summarises what is known about the individual costs of job loss in Australia. It is obvious from his survey that there are serious data deficiencies, and a shortage of comprehensive studies, but the studies available suggest considerable periods of unemployment for many of those affected. However, about as many job losers experience a pay rise as experience a pay fall upon re-engagement, although it is not possible to distinguish those affected by microeconomic reform from those affected by normal market influences. The Australian data, much of which is quite dated, seem to suggest that job loss and unemployment are the main costs born by workers as a group rather than wage reductions.

Borland provides a theoretical framework for thinking about the economics of displaced workers and suggests that we need a displaced workers survey similar to that in the United States. Although he quotes the Quiggin guess-estimate which suggests unemployment, greater work effort and labour force withdrawal reduce the gains of microeconomic reform by 25 per cent, it does not really seem possible, with the current state of knowledge and available data in Australia, to do a full accounting whereby short-run labour market gains and losses are set against the long-run productivity gains in a systematic way.

United Kingdom and United States job loss data are better. Job loss in the United States appears to inflict very heavy costs on workers affected. Jacobson, LaLonde and Sullivan (1993), using data on 20,000 high tenured displaced workers, show earnings fall by 15 per cent before separation, fall by a further 15 per cent on re-engagement and five years after the average earnings loss is still 25 per cent. This, however, appears to be a special group of workers and other studies show smaller effects between 5 and 15 per cent wage falls for the young, low paid and low tenured.

In the United Kingdom, unemployment for less than a year is usually associated with a 10 per cent wage loss on re-engagement largely eroding over two years. After a one year unemployment spell the earnings loss increases to 20 per cent (Gregory and Jukes 1997). These costs seem greater than those indicated by the Borland survey of Australian data and, at this stage, our adjustment costs appear to be centred on long spells of unemployment.

## 13.9 Concluding remarks

It is not possible with these few remarks to do justice to the richness of the papers and discussion. As might be expected from a group of experts the support for micro reform and perhaps a faster rate of reform was very strong. There is a sense of advocacy among many of the participants which should be recognised. Microeconomic reform involves costs to significant segments in the community and it may be that the costs are concentrated within small groups of individuals and the gains may be more widely spread and therefore less obvious. Under these circumstances, when losses are concentrated and visible, the forces for conservatism can become too strong politically and their influence may not be in the interests of the wider community. Hence, the need felt by many analysts to become advocates of reform in advance of the evidence of the exact nature of the outcome. In these circumstances, advocacy can lead to over optimistic predictions of the gains as seems to have happened in New Zealand. Over optimistic predictions do not establish the case for no microeconomic reform. They just make the case for being more careful.

These summary comments have primarily focussed on new and interesting empirical and research puzzles associated with economic growth and microeconomic reforms, primarily at the macro level. Inevitably, this focus can give the impression of uncertainty of results. To focus on some unresolved issues and puzzles, however, should not deter us from adopting a sensible reform strategy. Perhaps the most interesting unresolved question is why micro reform has not led to unambiguously better macro outcomes in Australia and New Zealand since 1990, particularly with regard to employment growth in

Australia, and productivity growth in New Zealand. As we commented in the beginning, the growth process is not well understood.

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# PART F: APPENDIX

# APPENDIX A
# WORKSHOP PARTICIPANTS

| | |
|---|---|
| Mr Robert Ackland | Australian National University |
| Dr Robert Albon | Australian National University |
| Mr Fred Argy OBE, AM | Australian National University |
| Mr Gary Banks | Productivity Commission |
| Ms Paula Barnes | Productivity Commission |
| Mr Winton Bates | Consultant |
| Mr Bob Bennett | Department of Industry, Science and Tourism |
| Professor Ron Bewley | University of New South Wales |
| Mr Graham Blinman | Productivity Commission |
| Associate Professor Jeff Borland | Australian National University |
| Mr David Borthwick | The Treasury |
| Mr Roger Carrington | New South Wales Treasury |
| Mr Ian Castles OBE, AO | Academy of Social Sciences in Australia |
| Mr Chris Chan | Productivity Commission |
| Dr Satish Chand | Australian Taxation Office |
| Professor Bruce Chapman | Australian National University |
| Mr Trevor Cobbold | Productivity Commission |
| Dr Tim Coelli | University of New England |
| Mr Andrew Coleman | The New Zealand Treasury |
| Professor Peter Dawkins | University of Melbourne |
| Dr Philippa Dee | Productivity Commission |
| Mr Robert Dolamore | Productivity Commission |
| Associate Professor Malcolm Dowling | University of Melbourne |
| Professor Steve Dowrick | Australian National University |
| Professor Brian Easton | Economic and Social Trust of New Zealand |
| Mr Jeff Edwards | Australian Competition and Consumer Commission |
| Mr Damien Eldridge | Productivity Commission |
| Professor Henry Ergas | Ergas & Associates |
| Professor Peter Forsyth | Monash University |
| Ms Joanne Frederiksen | Department of Primary Industries and Energy |
| Professor John Freebairn | University of Melbourne |
| Mr Michael Gadiel | Labour Council of New South Wales |
| Mr Ian Gibbs | Productivity Commission |
| Mr Norm Gingell | Productivity Commission |

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| Professor Bob Gregory AO | Research School of Social Sciences, Australian National University |
| Mr Paul Gretton | Productivity Commission |
| Mr Philip Hagan | Department of Health and Family Services |
| Dr Mark Harvey | Bureau of Transport and Communications Economics |
| Mr Scott Hook | Productivity Commission |
| Mr Rick Johnson | Productivity Commission |
| Dr Martin Johnson | Productivity Commission |
| Mr Barry Jones | Department of Industry, Science and Tourism |
| Dr Tom Karmel | Department of Employment, Education, Training and Youth Affairs |
| Dr Steven Kates | Australian Chamber of Commerce and Industry |
| Mr Robert Kerr | Productivity Commission |
| Professor Stephen King | University of Melbourne |
| Dr Ralph Lattimore | Productivity Commission |
| Dr Denis Lawrence | Tasman - Asia Pacific |
| Dr Philip Lowe | Reserve Bank of Australia |
| Dr Kathy McDermott | Department of Workplace Relations and Small Business |
| Ms Paulene McCalman | Productivity Commission |
| Mr Ian Monday | Productivity Commission |
| Professor Catherine Morrison | University of California at Davis & Hon. Visiting Professor at University of New South Wales |
| Ms Jan Muir | Bureau of Transport and Communications Economics |
| Mr Deo Mwesigye | Productivity Commission |
| Mrs Helen Owens | Productivity Commission |
| Professor Adrian Pagan | Australian National University |
| Mr Dean Parham | Productivity Commission |
| Dr Deborah Peterson | Productivity Commission |
| Mr Garth Pitkethly | Productivity Commission |
| Mr Herb Plunkett | Productivity Commission |
| Professor John Quiggin | James Cook University |
| Mr Paul Roberts | Productivity Commission |
| Dr Mark Rogers | University of Melbourne |
| Dr John Salerian | Productivity Commission |
| Mr Don Siemon | Brotherhood of St Laurence |
| Mr Richard Sisson | Department of Primary Industries and Energy |
| Professor Judith Sloan | The Flinders University of South Australia |

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| Professor Richard Snape | Productivity Commission |
| Mr Roland Stanmore | New South Wales Treasury |
| Mr John Street | Bureau of Transport and Communications Economics |
| Dr Arif Syed | Department of Industry, Science and Tourism |
| Ms Johanna Travis | Productivity Commission |
| Mr Jack Triplett | Brookings Institution |
| Mr Tony Urbanski | Department of Foreign Affairs and Trade |
| Dr Neil Vousden | Australian National University |
| Professor Cliff Walsh | University of Adelaide |
| Dr Graeme Wells | Australian National University |
| Mrs Dianne Whiteford | Department of Industry, Science and Tourism |
| Dr Lynne Williams | Productivity Commission |
| Professor Glenn Withers AO | Australian National University |
| Dr Graeme Woodbridge | Australian Competition and Consumer Commission |
| Mr Jim Wright | Department of Industry, Science and Tourism |
| Dr Shiji Zhao | Australian Bureau of Statisitcs |