PRODUCTIVITY COMMISSION

Productivity in Australia's Wholesale and Retail Trade

Staff Research Paper

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Abbreviations

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACRS	Australian Centre for Retail Studies
ACT	Australian Capital Territory
AIP	Australian Institute of Petroleum
AIR	Auto inventory replenishment
ANZSIC	Australian and New Zealand Standard Industrial Classification
APADA	Australian Petroleum Agents and Distributors Association
ARA	Australian Retailers Association
ASIC	Australian Standard Industrial Classification
CPI	Consumer price index
DISR	Department of Industry, Science & Resources
DIST	Department of Industry, Science and Tourism
EAN	European Article Numbering
EDI	Electronic data interchange
ERP	Enterprise Resource Planning
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
IAC	Industries Assistance Commission
IC	Industry Commission
IGP	Industry Gross Product
JIT	Just-in-time
MFP	Multifactor productivity
MTAA	Motor Trades Association of Australia

NCC	National Competition Council
nec	not elsewhere classified
np	not provided
OECD	Organisation for Economic Co-operation and Development
OPBT	Operating profit before tax
PC	Productivity Commission
PMAs	Public Marketing Authorities
PMV	Passenger motor vehicle
RBA	Reserve Bank of Australia
UN	United Nations
WMS	Warehouse management systems

Key messages

- At 11 per cent of gross domestic product, the wholesale and retail sectors make a major contribution to the overall performance of the Australian economy.
- The wholesale sector underwent a transformation in the 1990s. This is reflected in a markedly improved multifactor productivity (MFP) performance. Annual MFP growth, which was negative from the mid-1970s to the end of the 1980s, accelerated to 2.5 per cent throughout the 1990s.
- From 1993-94 to 1998-99, the sector was easily the most significant contributor to Australia's record aggregate productivity growth.
- Developments within the sector consistent with this productivity surge include:
  - the widespread adoption of productivity-enhancing technologies (eg barcoding, paperless pick systems and automatic re-ordering processes) which moved the sector from a storage-based system to a fast flow distribution network; and
  - greater competition acting as a catalyst for rationalisation (through mergers, acquisitions and firm exits) and outsourcing of non-core functions.
- Overall, wholesalers were able to handle very strong output growth in the 1990s (3.5 per cent per year) with reduced growth in labour and capital inputs.
- The retail sector also returned to positive productivity growth in the 1990s after a period of decline in the 1980s. The extent of change, while significant, was not as striking as in wholesaling. Nonetheless, the sector also made an important contribution to Australia's productivity growth.
- Key developments within retailing consistent with this improvement include:
  - intensified competition (eg Korean entry-level cars) leading to rationalisation in tandem with the widespread adoption of labour saving technologies;
  - retailers' responses to social and demographic changes (such as the growth in 'income-rich and time-poor' consumers); and
  - changes in legislation governing trading hours and reforms to industrial relations legislation which have increased the focus on enterprise-based work conditions.
- Overall, the retail sector met strong output growth with a reduction in labour growth and an increase in capital input growth.
- The impact of many factors such as technology, social changes, institutional reforms and increased competition mean that it is appropriate to view wholesale and retail trade as part of an integrated 'value network', rather than simply as elements of a sequential distribution function linking producers and consumers.

Overview

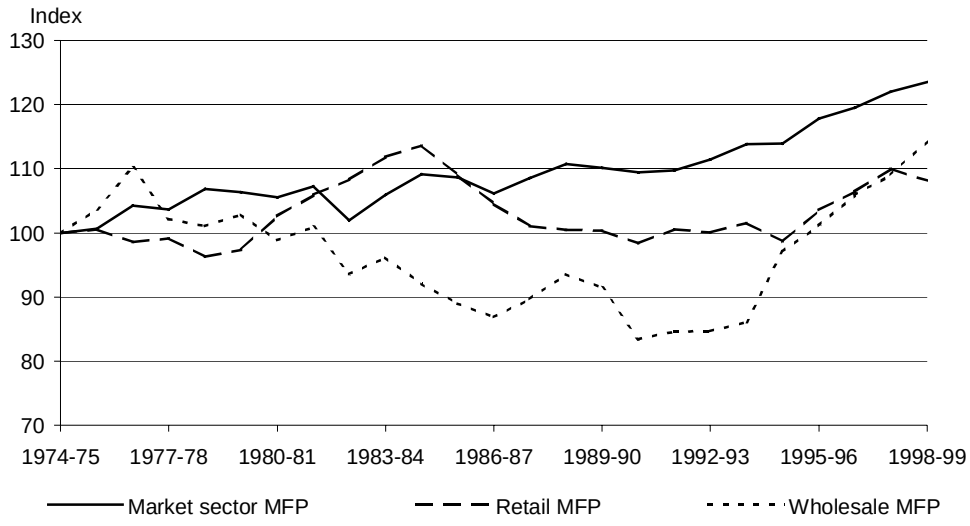
Australia experienced record productivity growth in the 1990s. Over the decade, the retail sector recorded moderate growth, whereas, from the mid-1990s, the wholesale sector became a major contributor to Australia's productivity resurgence. This is consistent with a key finding of this study — that, in the 1990s, the wholesale sector underwent a fundamental transformation in the nature of its operations.

For the latest aggregate productivity cycle, 1993-94 to 1998-99, annual multifactor productivity (MFP) growth rates were:

- 1.7 per cent for the *market sector* as a whole;
- 5.8 per cent for *wholesale*, which also made the largest contribution to market sector MFP growth (27 per cent) of any sector; and
- 1.3 per cent for *retail* (6 per cent contribution to market sector MFP growth).

However, 1993-94 was a productivity 'trough' year for wholesale (figure 1). Thus, MFP estimates based on the beginning and end points of the latest cycle could be overstating underlying wholesale productivity growth.

Figure 1 **Multifactor productivity in wholesale, retail and market sector**



To address this concern, trend estimates of MFP growth were developed. These trend data confirm that, for the latest cycle, the wholesale sector still recorded the highest annual MFP growth (3.2 per cent trend) and was the most significant contributor (17 per cent on trend) to market sector MFP growth.

The wholesale sector had declining measured productivity in the 1980s, lifted its performance in the 1990s and surged in the latter half of that decade. Retail sector MFP also improved in the 1990s, emerging from the productivity 'doldrums' which characterised its performance in the 1980s. The sector has now re-embarked on a growth path similar to that of the 1970s. Given this past performance, the recent strong contributions from both sectors is striking.

Some doubts have been raised about how well productivity is measured in these sectors. In particular, there are concerns that changes in the range and quality of services provided may not be reflected in measured output, thereby leading to an underestimation of productivity growth. There may be some validity to these arguments, especially for certain retail industries in the late 1980s. This paper canvasses a number of measurement issues such as the effect on MFP estimates of increased trading hours, greater economies of scale in retail and the increased incidence of outsourcing in wholesaling. Certainly, negative productivity growth in some periods does leave open the possibility of measurement error. However, the broad trends and especially the strong performance in the 1990s cannot be put down to measurement error.

That said, broad sectoral level productivity outcomes do leave some important questions unanswered. In particular, what is driving the productivity performance of the wholesale and retail trades? Has there been a fairly even shift in the performance of all constituent industries, or have some done better than others?

Despite their significance, there is a paucity of studies on Australia's wholesale and retail trade sectors. The international literature is also limited. This study seeks to address some of these shortcomings. It draws on data from the Australian Bureau of Statistics (ABS) and other information supplied by a range of industry representatives consulted over the course of this study.

The examination of productivity growth follows a framework, developed by the Productivity Commission (PC 1999b), which groups productivity determinants into:

- *Immediate causes* — such as the adoption of new technology, firm organisation and management practices;
- *Underlying factors* — such as the extent of competition in markets and general demand and supply conditions; and

- *Fundamental influences* — covering factors such as the prevailing policy and institutional environment.

These influences are not independent. For example, a competitive environment increases firms' incentives to invest in productivity-enhancing technologies.

The Australian distribution sector

At the outset, it is worth noting that MFP estimates in this study are derived from ABS data. Thus, ABS definitions determine the industry coverage for this study. This means that retail trade covers the retailing of goods, but not services (eg haircuts and movies).

Even excluding these services, the distribution sector (wholesale and retail trade) makes an important contribution to the Australian economy — around 11 per cent of gross domestic product in 1998-99. In that year, total output (value added) from 45 000 wholesale businesses and 124 000 retail businesses was over $60 billion.

In 1997, there were around 471 000 persons employed in wholesale and over 1 million employed in retail. In the two decades to 1997, wholesale employment increased by 30 per cent and retail employment by 35 per cent — above the average growth for the market sector of 20 per cent. The composition of employment in wholesale and retail differs markedly. The retail sector has higher proportions of females, young people, casuals and part-timers in its workforce. On the other hand, the proportion of employees with post-school qualifications is higher in wholesale.

Real investment in wholesale and retail trade, although volatile, has grown steadily and is reflected in strong growth in their net capital stocks since 1960. The share of payments to labour (eg wages) relative to capital (eg income before depreciation, interest and taxes) is higher in retail, reflecting its greater labour intensity.

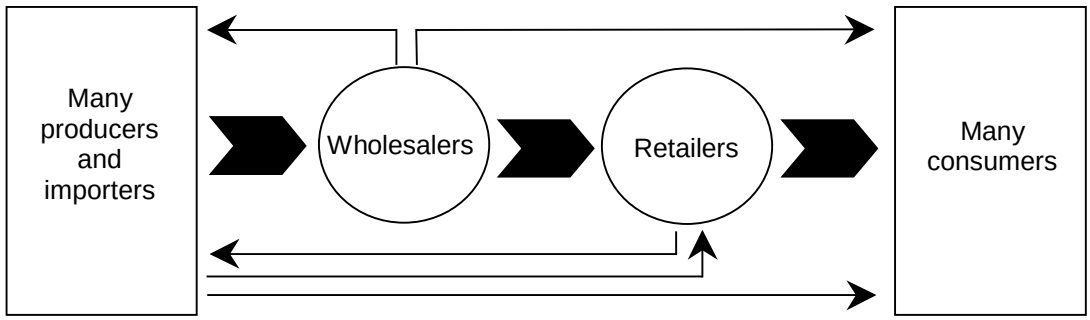
Wholesale and retail trade have the lowest profit margins of Australian industry sectors.

The distribution function

Wholesale and retail trade make up the bridge between producers and consumers. Wholesalers collate, store and disburse products and retailers specialise in providing services that are useful to consumers and producers (eg a range of goods, locational and time convenience, customer service, packing and credit facilities). The distributive trades receive their returns through price 'wedges' between ex-factory, wholesale and retail prices.

Distribution is continually evolving and a compression of the traditional 'sequential distribution function' (heavy arrows in figure 2) is increasingly evident. For instance, more goods producers now integrate wholesale functions by distributing their products direct to retailers. Similarly, some retailers backwardly integrate into wholesale operations. There are franchises between manufacturer-suppliers and retailers, and instances where producers sell direct to consumers through factory door sales. Tele-shopping and the Internet are broadening the scope for consumers to bypass wholesalers and retailers — a phenomenon known as disintermediation.

Figure 2 **Distribution functions in wholesale and retail trade**



There also are examples of independent retailers forming buying groups to seek a better deal from wholesalers. Rather than integration, this represents an extra stage between wholesalers and retailers. In addition, many wholesalers make significant trade sales 'backward' to producers.

As a result of forward and backward integration of the various components of distribution and the potential for continuing disintermediation, it is appropriate to view wholesale and retail activities as part of a 'value network' rather than as sequential links in a chain.

Developments in distribution are more visible at the retail level. These include:

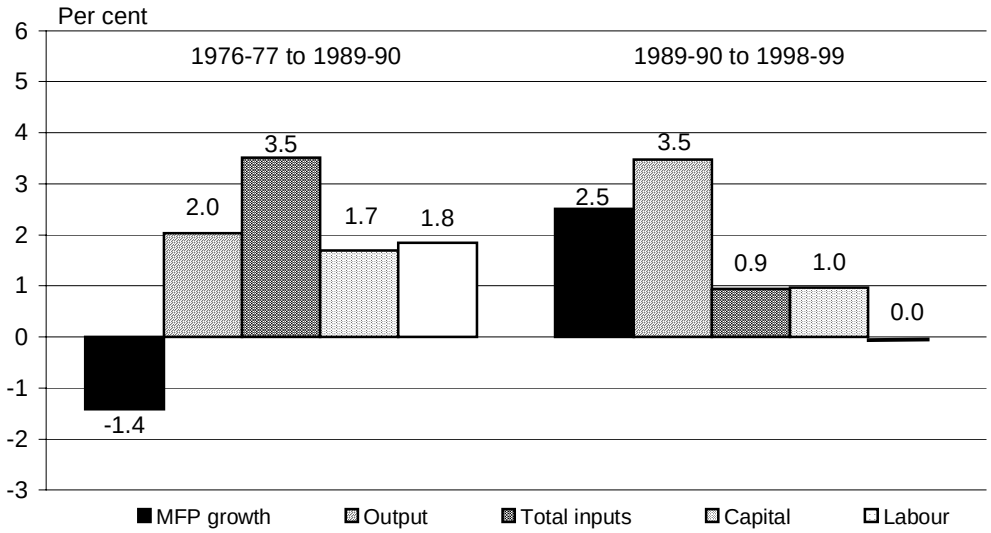
- the increasing attention given to meeting the needs of income-rich, but time-poor, consumers, through extended trading hours and locational convenience;
- malls seeking to make shopping a more family-oriented lifestyle outing by including food courts, cinemas and entertainment;
- the emergence of megastores (or 'category killers'), often located in fringe areas to take advantage of low cost land for extended floorplans and parking; and
- a shift of 'traditional' retail functions to consumers (eg self-service petrol stations) and producers (eg increased reliance on brand advertising and warranties rather than advice from shop assistants).

Most of these developments have implications for productivity estimation. For example, the 'category killers' tend to have a lower labour intensity than the department stores from where much trade is being taken. However, this study has found that the richest vein of factors driving productivity improvements in distribution lie in wholesaling — that is, behind the consumer-retail interface.

Wholesale trade

The contributions to wholesale MFP growth are shown in figure 3. Between 1976-77 and 1989-90, negative MFP growth was the result of input growth outstripping output growth. The turnaround in MFP growth in the 1990s was generated by high output growth, relative to labour and capital input growth.

Figure 3 **Wholesale, contributions to MFP growth**



MFP growth is equal to output growth less total input growth. Total input growth is equal to the sum of the contributions from capital and labour input growth.

The additional growth in wholesale sector output in the 1990s was largely due to the Machinery and motor vehicle subdivision (figure 4). Output growth in Basic materials remained steady, while the output from the Personal and household goods subdivision was relatively flat. Labour growth (hours worked) declined in Basic materials and grew in Machinery and motor vehicles and, more slowly, in Personal and household goods. Investment in all subdivisions was volatile over the period, but trended upwards.

During the 1990s, labour productivity (the only productivity measure available at this level of disaggregation) varied between the three subdivisions. Labour

productivity growth in Basic materials and Machinery and motor vehicles generally increased. In contrast, labour productivity in Personal and household goods fell.

As the three subdivisions are roughly equal in terms of their shares of wholesale output, the data in figure 4 points to the Machinery and motor vehicle and Basic materials subdivisions as the main sources of the acceleration in productivity growth in the 1990s.

Figure 4 **Trends in wholesale subdivisions**

Productivity determinants

To shed light on the productivity determinants, several important industry classes were targeted for closer scrutiny, based on growth rates in sales per hour worked. These were the wholesaling of Petroleum products, Timber, Building supplies, Computers, Motor vehicles and Motor vehicles new parts.

One common theme across the sampled industries — which may well apply more broadly across the sector — was the striking uptake of productivity enhancing technologies in the 1990s. Indeed, industry consultations indicated that:

- the development and rollout of barcoding and scanning revolutionised inventory management and provided an impetus to develop more productive electronic data interchange systems;
- the concept of warehouses as large storage facilities gave way to an emphasis on faster flows through 'clearing' facilities;
- new technologies and improved software gave a boost to processes built around 'just in time' concepts — for example, quick response systems such as automatically triggered inventory replacement were widely implemented; and
- minimisation of double handling and centralisation of distribution, leading to the retirement of less productive capital, accelerated.

As a result of the rapid adoption of new technologies, labour intensities declined in many facets of wholesaling. One practical example from the computer industry relates to the savings from more automated systems — stocktakes that used to take three to four weeks can now be completed in one day with a lower error rate.

The industry consultations also suggest that, in the 1990s, there was a move away from hard assets like large inventories, trucks and numerous warehouses, toward 'smarter' information systems. The high rise 'stacking crane' warehouses of the 1970s and 1980s gave way to faster and leaner operations in the 1990s. These developments are consistent with the relatively flat growth in hours worked.

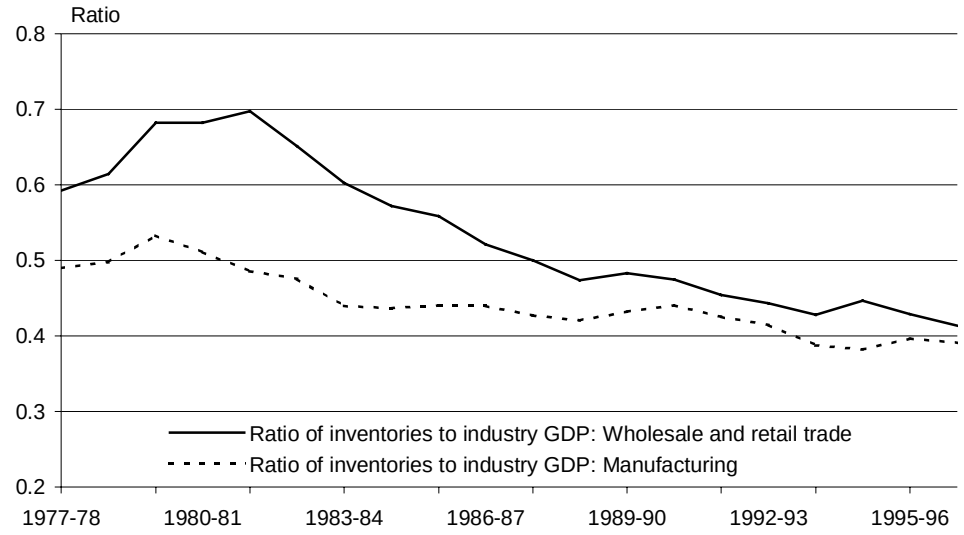
The adoption of new technologies is reflected in a general decline in the ratio of inventories to output for both the distribution sector and for manufacturing (figure 5). Of course, while these data reveal a large fall in stocks carriage, they do not convey the full benefits of more rapid, and less labour-intensive, distribution.

Technology and developments in logistics management were not the only factors affecting the turnaround in wholesale productivity. Many wholesalers have contracted-out elements of their operations. For example, the petroleum distribution sector sought to 'get out of capital' by outsourcing the transport of fuel to dedicated hauling companies (which could also explain some of the reduction in inventories).

There also has been a continuing process of rationalisation through mergers, acquisitions and firm exits which can provide benefits through lower overhead costs per unit of output. In some wholesale industries, such as timber, hardware and petroleum, rationalisation has been extensive. Competition, a potent underlying force affecting productivity, appears to have been the key driver for much of this

rationalisation, which has resulted in lower labour requirements and the retirement of less productive capital. For example, in the car industry, the advent of the low cost Korean 'drive away, no more to pay' car placed significant pressure on distributors (as well as manufacturers, importers and retailers) to pursue avenues to reduce costs.

Figure 5 **Ratio of inventories to output for the distribution sector and manufacturing**



Underlying demand conditions were also important. For example, much of the productivity growth in car wholesaling in the 1990s can be attributed to a significant rise in the demand for cars and the positive effect this had on industry output. On the supply side, the sector was able to sustain rapid output growth over a six year period without commensurate growth in inputs.

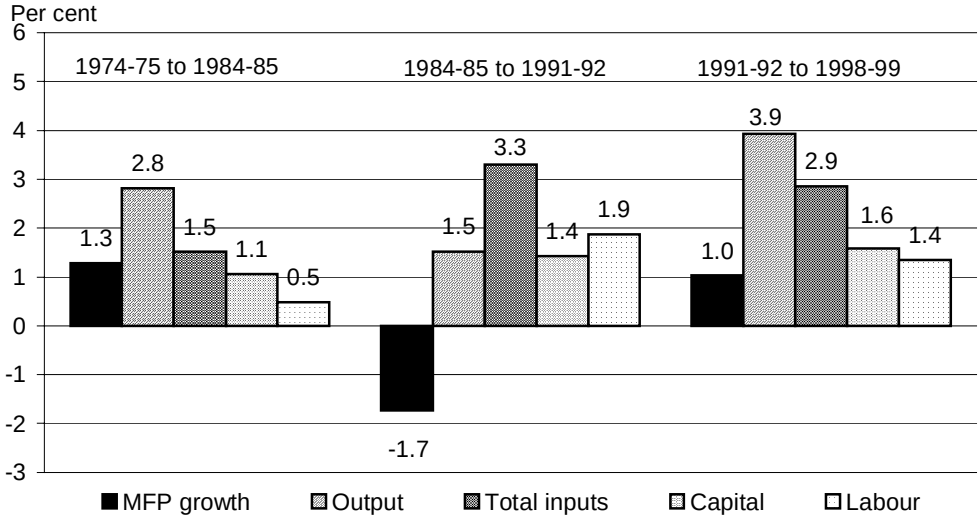
Important fundamental influences on productivity include reforms in industrial relations arrangements, which increased workplace flexibility by reducing demarcations and facilitating the introduction of split shifts.

Retail trade

The contributions to retail MFP growth are shown in figure 6. Higher labour and capital input growth (relative to output growth) led to declining MFP between 1984-85 and 1991-92. Positive MFP growth in the 1990s — equivalent to that of 1974-75 to 1984-85 — was the result of increased output growth achieved with lower labour growth, but with little change in capital growth.

An increase in trading hours associated with deregulation provides one possible explanation for the increase in labour input growth in the 1980s. Average trading hours in Australia increased during the 1980s, implying an increase in hours worked (and greater utilisation of existing capital stock). However, counterbalancing effects also were evident — for example, more liberal opening hours appear to have strengthened the position of large firms which have gained market share at the expense of smaller and relatively more labour-intensive establishments. Also, the timing of deregulation differed across, and within, jurisdictions (and has yet to be fully implemented). It seems questionable therefore, to categorise such reforms as a purely 1980s 'shock'. Growth in specialised retailing and vehicle servicing also appears to have played a role in the increase in labour inputs.

Figure 6 **Retail, contributions to MFP growth**



MFP growth is equal to output growth less total input growth. Total input growth is equal to the sum of the contributions from capital and labour input growth.

Retail productivity improvement in the 1990s was not as significant as in wholesale. Industry consultations suggest that immediate productivity determinants may not have had as sharp an impact on retailing. This is not to underplay the impact of new technologies. Rather, it suggests that the factors influencing retail appear to be more varied — probably reflecting the diversity of activities in the sector.

The improvement in the 1990s was primarily the result of reductions in labour input growth in several industry groups, although, in some cases, output growth was an important factor. The reduction in labour input growth appears to have been the main influence on productivity in: Supermarkets and grocery stores; Department stores; Clothing and soft goods; Recreational goods; Motor vehicle retailing; and Motor vehicle services (figure 7). That said, high output growth seems to have been the main factor behind the productivity growth in Motor vehicle retailing.

Figure 7 **Trends in retail industry groups**

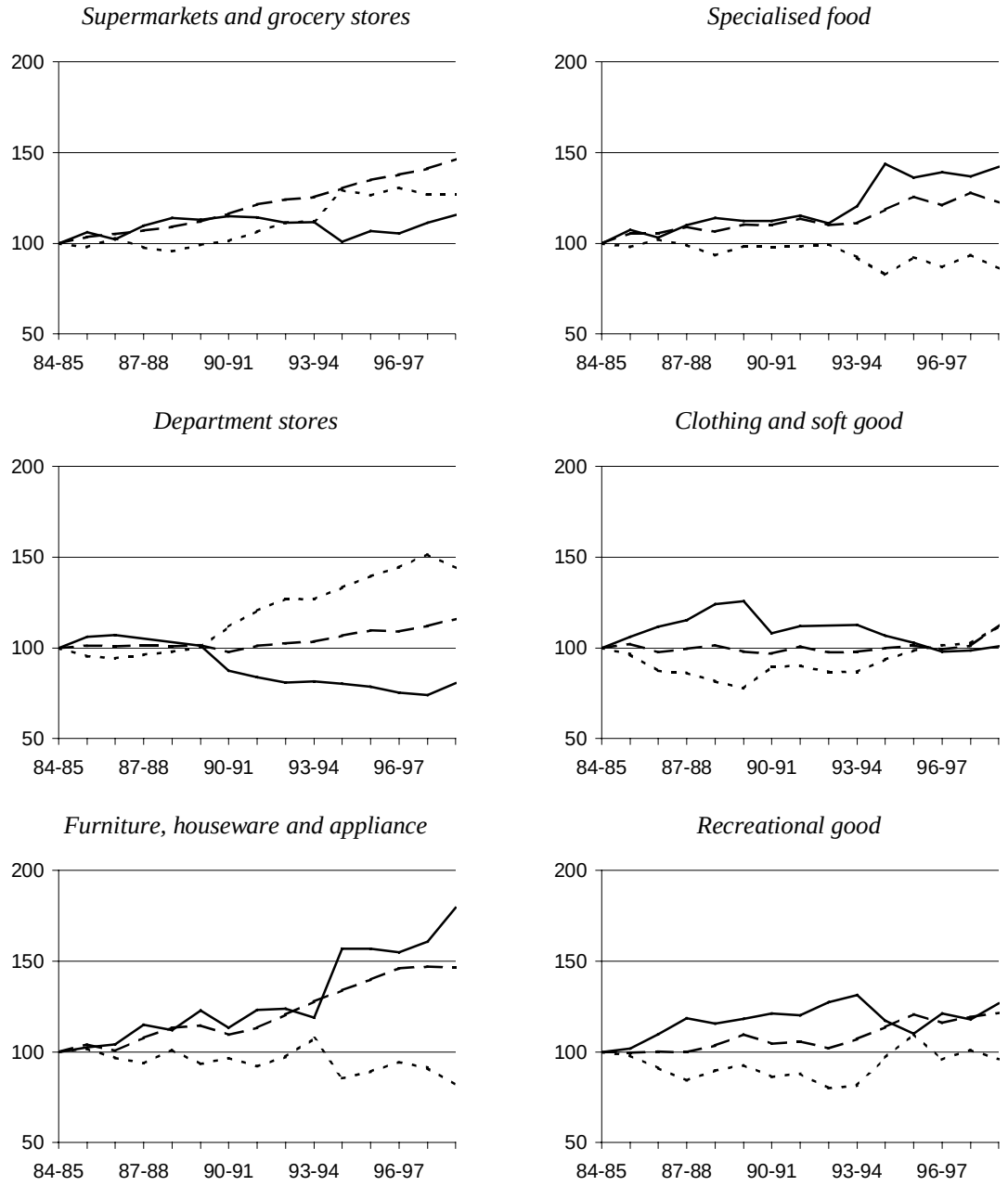


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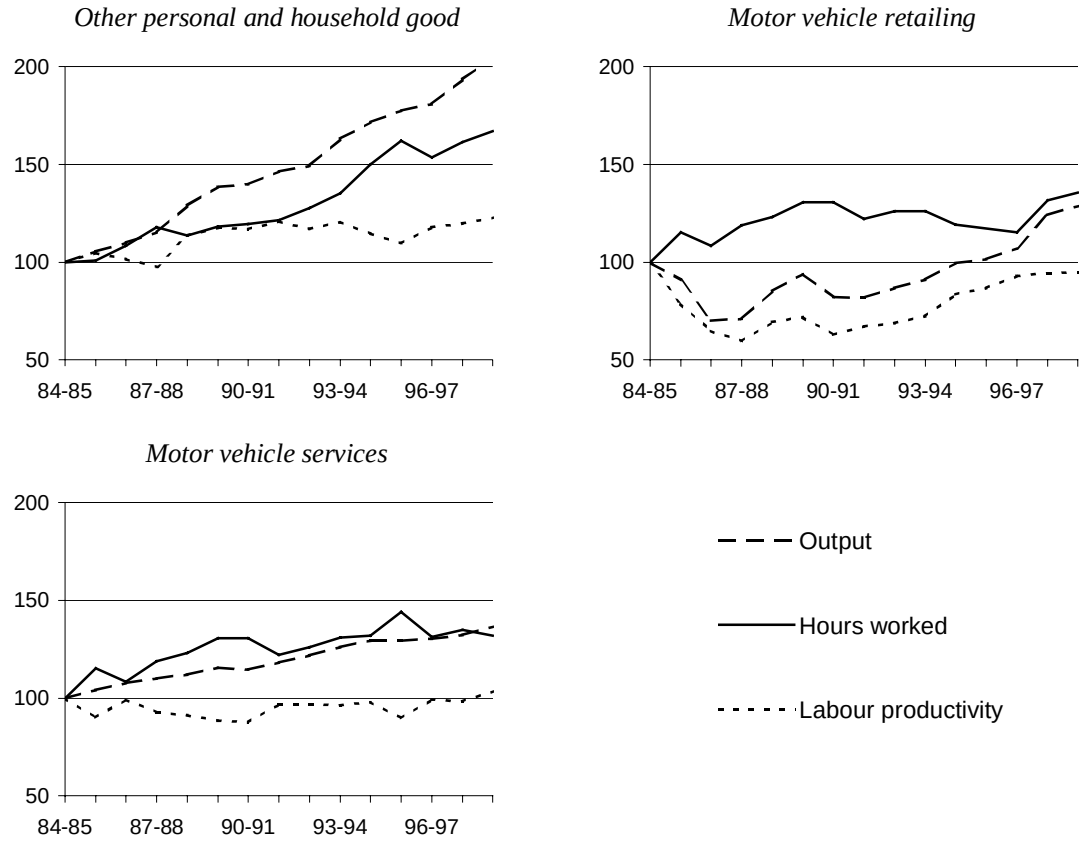
Figure 7 **(Continued)**



Several industry groups which had a negative impact on retail sector labour productivity growth in the 1980s became positive contributors in the 1990s. The turnaround was most noticeable in: Motor vehicle retailing; Clothing and soft goods; Motor vehicle services; and Recreational goods. Only Specialised food and Furniture, houseware and appliances made negative contributions to labour productivity growth in the 1980s and 1990s.

Productivity determinants

Most retail industries experienced sales growth during the 1990s. Sustained economic growth was associated with low inflation and low interest rates which increased consumer confidence. For example, Motor vehicle retailing recorded strong growth in sales associated with a concomitant increase in affordability.

Competition was a key factor influencing rationalisation, investment in technology, greater integration of the supply chain and better management practices. The importance of competition for productivity was raised often in industry consultations. For example:

- continuing deregulation of trading hours increased competition across retail in general;
- in the clothing and recreational retailing, the emergence of the 'category killers' and speciality stores intensified competition;
- in the car industry, lower tariffs coupled with the impact of Korean entry level cars led to an increase in imports and competitive pressures, particularly in the small car market; and
- the growth of independent networks increased competition in fuel retailing.

Rationalisation during the 1990s was a key factor contributing to labour input savings. It was an important factor in improving productivity in Motor vehicle retailing where dealerships fell from 3650 locations in 1984 to around 1800 in 1999. Similarly, in Motor vehicle services, the number of service stations continued to fall — from around 20 000 in the 1970s to about 8000 today.

In other areas of retailing, there was a trend away from individual boutique stores toward specialty chains that could take advantage of economies of scale in the supply chain and better store management systems. For instance, some specialist clothing chain stores operate with low labour but high technology inputs, such as automatic re-ordering at the point of sale.

Technological change, such as scanning and computerisation, enhanced retail productivity by reducing labour input and changing management systems. The scanner at the checkout and the single operator-console at service stations are obvious examples of labour saving technology. More precise and timely data on retail operations allowed firms to better assess store productivity and to examine productivity at the individual task level.

The supply chain became more integrated in the 1990s. This led to productivity improvements, with competition as the catalyst and technology as the enabler.

Finally, reforms in industrial relations arrangements were identified as being important for better matching employment conditions (eg different proportions of permanent, part-time and casual employees) to firms' changing requirements.

Concluding comments

The use of less robust data at higher levels of disaggregation and the targeted focus of the industry consultations could mean that the selected industries may not be fully indicative of the overall performance of wholesale and retail trade (box 1).

That said, the industry consultations generally supported the trends identified in the data as they related to particular wholesale and retail industries.

Box 1 **Data limitations**

Aggregate level (market sector) data for Australia as a whole is the most robust tier of MFP estimates. To the extent that there is any mismeasurement at the division level (eg wholesale trade), this is likely to 'wash out' at the highest level of aggregation. For example, if wholesale output and productivity were overstated because of contracting out of transport, the overstatement in wholesale would be matched by an understatement in the transport industry. Output and productivity for the market sector would be unaffected.

In undertaking this study, there was a need to decompose the MFP estimates to the level of the divisions that comprise the market sector. A high degree of confidence is attached to these estimates. Explaining the productivity performance of the distribution sector requires further disaggregation. However, capital services data are not available for the wholesale and retail *subdivisions* (eg Basic materials). Although investment data are available, these are a poor indicator of capital input. Consequently, MFP estimates are not available and further analysis is based on measured labour productivity in these subdivisions.

For the next tier — wholesale and retail *groups* (eg Mineral, metal and chemical) — labour productivity data are obtainable only for retail due to the lack of output data for wholesale groups. Therefore, sales per hour worked was used as a proxy for labour productivity in wholesale groups. Based on an examination of productivity performance at the wholesale and retail group level, the industry case studies and consultations were pitched at the most important industry *classes* (eg Petroleum products) which make up these groups. Importantly, the selected classes represent a significant proportion of the output and/or sales of their respective groups.

For the wholesale division, this study sought to examine the hypothesis that the improvement in the MFP performance was the result of increased output and more efficient use of inputs: specifically, that demand increased in the 1990s, unit labour input requirements were reduced and capital productivity improved. Nonetheless, such was the growth in output that total labour input increased marginally.

Assessment of the industries targeted for this study and the information obtained more generally from the consultations indicate that large productivity gains in wholesale would be expected in the early to mid-1990s. Moreover, the emphasis placed on improved productivity through technology, an attendant reduction in labour requirements and the importance of output growth in many sectors is borne out in MFP estimates — albeit that it was not possible to confirm the absolute magnitude of the productivity surge. In sum, the performance of selected wholesale

industries in the 1990s was, in terms of the extent and the timing of changes, consistent with the productivity surge shown in the statistical analysis.

In terms of retail, the hypothesis was that the improvement in MFP was associated with increased output growth, a reduction in labour input growth and some improvement in capital productivity. This study identified a reasonably consistent set of productivity determinants in most industries — stronger demand, rationalisation, market share gains in establishments with relatively lower labour requirements (eg 'category killers' at the expense of department stores) and the adoption of new technology. The explanation may not be comprehensive, but the industry consultations support the trends shown for the 1990s in the sectoral productivity estimates. On balance, for the retail sector, which is less important for explaining Australia's aggregate productivity growth, the sectoral estimates are broadly in line with market conditions and the information gathered from the industry consultations.

1 Introduction

Wholesale and retail trade play a crucial role in the distribution and exchange of goods from producers and importers to widely-dispersed commercial and household customers. With this role, they are sometimes referred to as the distributive trades.

Wholesale and retail trade add considerable value in the Australian economy. In 1998-99, they each formed a little over 5 per cent of GDP.

Previous studies of Australia's productivity performance have suggested that the wholesale and retail sectors account for a large part of Australia's aggregate productivity trends (IC 1997a; PC 1999b). For example, estimates in PC (1999b) attributed about 30 per cent of the very strong growth in Australia's aggregate productivity from 1993-94 to 1997-98 to wholesale trade. On the other hand, the relatively slow aggregate productivity growth in the 1980s was associated with low (even negative) growth in retail productivity (IC 1997a). (The contributions of wholesale and retail trade to aggregate trends are updated in chapter 3 of this paper.)

However, there are some doubts about how well productivity is measured in the distributive trades. Part of the doubt arises from general misgivings about how well output can be measured in service industries. But there have also been specific questions about the measurement of output in wholesale and retail trade. For example, Lowe (1995) raised doubts about whether retail output measures include improvements brought about by the added convenience (and added input requirements) of longer trading hours. It is argued that failure to account for service improvements on the output side, while including additional inputs, leads to some downward bias in productivity estimates.

Despite their importance, there are very few Australian studies of the wholesale and retail trade sectors. This makes it difficult to readily check the plausibility of estimates of productivity trends against other sources, or to offer possible explanations for identified productivity trends.

A study of productivity trends in the wholesale and retail trade sectors in Australia therefore seemed warranted.

1.1 Objectives and scope

This paper is not intended to be a thorough study of the distributive trades. Such an exercise is well beyond its scope. Rather, the objectives of the paper are to:

- improve understanding of productivity trends in wholesale and retail trade and, in particular, examine the plausibility of measured productivity trends; and
- offer some reasonable explanations for the identified trends.

The study is mostly backward looking, in the sense that it seeks to understand and explain past trends. Naturally, this does bring into focus some recent developments — specifically, the advent of the Internet, which is widely thought to have fundamental implications for the wholesale and retail trades. While these current trends are given some coverage, it is not an objective of this paper to explore their implications fully or to suggest what the future might bring.

The wholesale and retail sectors have broader economic and social implications, such as access to 'corner store', suburban and regional retail outlets. But such considerations are, again, beyond the study's scope. The study keeps predominantly to a productivity focus.

The industry coverage used in this study should also be made clear. Coverage is dictated in this paper by ABS industry definitions. This means, for example, that retail trade covers the retailing of goods, but not services (for example, haircuts and movies). The study therefore is not about the full gamut of 'retailing', as commonly perceived.

Whilst some impacts of policy changes are highlighted at various points, it is not an objective of the study to identify policy options.

1.2 Approach and structure of the paper

The next chapter provides an overview of the nature of the distributive trades and their main trends. It highlights the major factors that have brought change in the sector's structure and behaviour. In doing so, it sets up many of the productivity-related issues that are dealt with in detail in subsequent chapters.

The chapter also provides some guidance on the interpretation of productivity trends. From a broad perspective, productivity growth is important for improvements in living standards (PC 1999b). However, there are other dimensions to consider in relation to these sectors. There is, by definition, a large interface between retail industries and consumers. Developments in retail can have direct effects on consumers (for example, moves to self service) which improve the

productivity of producers, but may also have direct (and offsetting) welfare implications for consumers. Thus, whilst it is very important, productivity performance should not necessarily be given complete primacy.

The paper draws on unpublished ABS data to provide a more detailed examination of trends within the wholesale and retail trade sectors. The details of data sources and methods are presented in appendix A.

The issue of accuracy of measurement of output is introduced as the first task of chapter 3. There is supporting material in appendix B.

The chapter then presents an overview of productivity trends in the wholesale and retail sectors, in order to highlight periods of particular interest and output and input trends to follow up in subsequent chapters.

The sectoral productivity estimates presented in chapter 3 are an update and extension of the estimates for 1985-86 to 1997-98 that were presented in PC (1999b). The update reflects revisions by the ABS to its capital input measures. The estimates are extended forward an additional year to 1998-99 with the availability of new ABS data; and are backcast from 1984-85 to 1974-75, based partly on sectoral labour input estimates from Gretton and Fisher (1997).

Chapters 4 and 5 explore the major sources of change in productivity performance in the wholesale and retail sectors respectively. The industries that have been prominent in the sectoral productivity trends are examined in more detail (and some of that detail is included in appendix C). For these more detailed industry examinations, industry representatives and academics were consulted to test the plausibility of estimated productivity trends and to seek guidance on explanations for the trends. The individuals and organisations consulted are listed in appendix D.

The investigation of the sources of productivity growth has been informed by the framework of productivity determinants set out in chapter 4 of PC (1999b). A key feature of this framework is the distinction between immediate influences on productivity growth (for example, technology, rationalisation, management and work practices), underlying influences (for example, competition) and fundamental influences (for example, the government policy environment and social attitudes).

An attempt is made to concentrate throughout the paper on the industry segments and issues that matter most from a productivity point of view. Getting the balance right is not always possible. For example, the wholesale trade sector matters most in terms of its productivity improvement and contribution to aggregate productivity trends in the 1990s. However, relatively speaking, more information is readily available on developments in retail trade.

2 Nature of distributive trades

This chapter examines aspects of wholesaling and retailing to help understand better the productivity performance of these sectors. Specifically, canvassed below are:

- the role of the wholesaling and retailing 'distributive' trades;
- a snapshot of the Australian distribution sector;
- factors influencing the environment in which the sector operates; and
- issues bearing on the assessment of productivity trends in the sector.

2.1 Role of the distributive trades

At the simplest level, the economy can be thought of as containing many thousands of firms producing goods and services for a large number of other firms and millions of consumers. While many producers of services deal directly with consumers in face-to-face transactions, this is generally not the case for goods. An intermediation role is needed to provide distribution channels through which goods can reach consumers. The wholesale and retail trades provide this role and collectively can be thought of as a bridge between myriad goods producers and consumers.

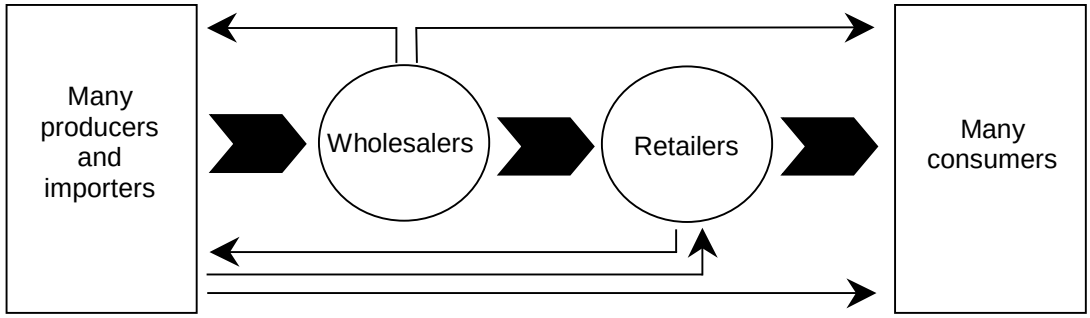
As economies develop, technological advances in production and the desire to expand sales into more distant markets — coupled with reductions in transport costs — lead to more transactions between producers and consumers. These transactions often can be most efficiently performed by dedicated wholesale and retail institutions which specialise in moving goods, supplying product information, matching buyers and sellers, and reducing the costs of exchange. The growth in the distributive trades is demonstrated in the work of Barger (1955) and, more recently, Oi (1992). For example, in the United States, for every 100 persons producing goods in 1880 there were around nine workers employed in distributing those goods. This figure rose progressively to 13 workers in 1900, 46 workers in 1950 and 77 workers in 1980.

Wholesalers act as collection, warehousing and disbursement centres and retailers specialise in providing services that are useful to consumers and producers (for example, a product range, serving customers, packaging and credit facilities). The

distributive trades receive their returns by introducing price 'wedges' between ex-factory, wholesale and retail prices (including transport margins).

As noted above, wholesalers and retailers provide an intermediation role between goods producers and consumers. Thus, for instance, a manufacturer may produce, say, packets of biscuits which are delivered to wholesalers in a number of markets. The product is then distributed to retailers, such as supermarkets, which provide a wide-ranging product line for consumers — this is known as a 'sequential distribution function' and is depicted by the bold arrows in figure 2.1.

Figure 2.1 **Distribution functions in wholesale and retail trade**



However, there are also instances where distribution is integrated such as:

- producers internalising the wholesale function by distributing their products directly to retailers — known as forward vertical integration (Betancourt 1993);
- retailers internalising the wholesale function — known as backward vertical integration — for example, Australia's three major supermarket chains (Coles, Woolworths and Franklins) have their own distribution warehouses that are supplied directly by producers.

In other cases, the distribution function may be bypassed in some way. These are shown by the thin arrows in figure 2.1 and include:

- producers selling directly to consumers through factory door sales (for example, wineries and some clothing), and party plans (for example, cosmetics and kitchen containers); and
- franchises between manufacturer-suppliers and retailers, such as McDonalds, and suppliers and wholesalers, such as Shell and distributors (Merrilees and Miller 1996).

Indeed, developments such as tele-shopping and Internet shopping, which are covering a burgeoning range of goods, are providing greater scope for consumers to

order goods directly from producers, thereby bypassing both wholesalers and retailers — a phenomenon known as 'disintermediation'.

Other distributional permutations include backward movements in the chain (also shown in figure 2.1), for example, wholesalers supplying inputs for producers, such as 'trade sales' of inputs (for example, tools and timber) and independent retailers forming buying groups to seek a better deal from wholesalers. The latter instance, represents a further 'profit point' in the chain between wholesalers and retailers.

It is not surprising that those involved in the distributive trades who were consulted during this study (see appendix D) considered that it is now more appropriate to see the distributive trades as part of a 'value network' rather than as sequential links in a chain. This reflects much greater integration of production, wholesaling and retail and a compression of the 'distribution chain', particularly since the late 1980s.

2.2 A snapshot of the Australian distribution sector

The productivity calculations reported in chapter 3 are derived from data prepared by the Australian Bureau of Statistics (ABS). Thus, ABS definitions determine the industry coverage for this study (see appendixes A and B). The ABS defines the wholesale and retail sectors accordingly:

Wholesale sector: Businesses which are engaged primarily in the resale of goods to businesses or institutional users, including wholesale merchants who take title to the goods they sell, separate sales branches (not being retail businesses) operated by manufacturing businesses, commission agents, import and export agents, purchasing agents, petroleum products distributors, and cooperatives and marketing boards engaged in marketing farm products.

Retail sector: Enterprises mainly engaged in the resale of new or used goods to final consumers for household consumption or in selected repair activities such as repair of household equipment or motor vehicles — for example, department stores and shops, car retailers and service outlets, stalls, mail order houses, door-to-door sellers, milk vendors, vending machine operators and consumer cooperatives.

This classification emphasises trade in goods. Merrilees and Miller (1996, p. 3) consider that the ABS classifications:

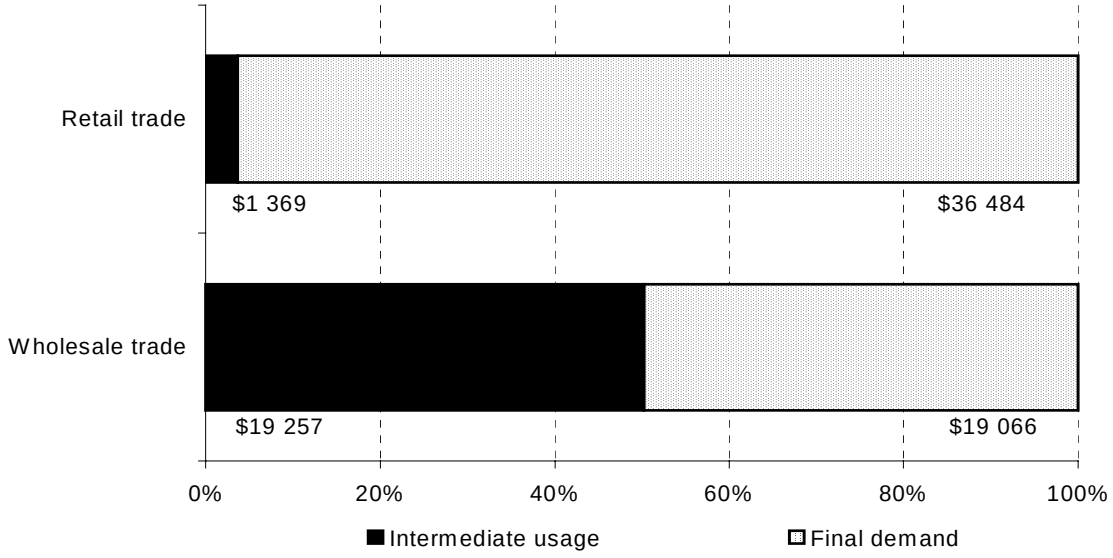
> … understate the total importance of retailing, which includes the often neglected sector called services retailing. *Services retailing* is defined as services supplied to final consumers and includes hairdressing, plumbers, real estate, dentists and house cleaning. Often the ABS classifies services retailing as personal service, community services or business services. The reality is that most of these organisations are retailers in that they sell goods and/or services to final consumers.

When interpreting some of the data in this study, it is important to bear this limitation in mind.

Based on the ABS classifications, in 1993-94, around half of the output of the wholesale sector was destined for final demand and half was used by other industries. Over 90 per cent of the retail sector's output went to final demand (figure 2.2).

Figure 2.2 **Wholesale and retail trade, shares of intermediate usage and final demand, 1993-94**

$ million



Data source: Estimates based on ABS 5209.0.

The more direct link between retailers and final consumers is evident from table 2.1 which presents some of the major wholesale and retail trading companies in Australia. Most of the retailing firms are 'household names', whereas wholesalers, which are a step back in the chain from consumers, are not as well known.

Table 2.1 **Examples of major participants in Australia's distribution sector**

Company	*Main activity*
Wholesale trade	
Mitsui and Company	Wholesale/import/export of goods ranging from coal to computers
Australian Wheat Board	Statutory marketing authority
Davids Limited	Food and liquor products
Retail trade	
Woolworths	Groceries
McDonalds	Fast food
Harvey Norman	Personal and household goods

Sources: Business Review Weekly (various issues).

Size and investment

Combined, the distributive trades make an important contribution to Australia's gross domestic product (GDP). In 1998-99, the contribution of the combined wholesale and retail trade sectors was around 11 per cent of GDP. In comparison, agriculture's share was 3 per cent (ABS 5204.0).

Real output (value added) in the wholesale trade sector, measured in 1997-98 prices, increased from around $19 billion in 1984-85 to $31.2 billion in 1998-99 — an average annual rate of growth of 3.6 per cent. Over the same period, real output in the retail trade sector increased from around $21.4 billion to $31.1 billion — an average annual rate of growth of 2.7 per cent (ABS National Accounts database on EconData).

The number of operating businesses in wholesale trade has remained fairly stable throughout the 1990s, at around 45 000 businesses. Growth in retail businesses has also been relatively stable. In 1997-98, there were around 124 000 retail businesses.

There was an upward trend in real investment by the distribution sector from 1984-85 to 1998-99, despite some fluctuations (figure 2.3). This volatility was more marked for the wholesale sector, where there was an appreciable ramping up of investment in the late 1980s, followed by a large fall in the early 1990s. Since then, investment has generally been increasing in both sectors.

Trends in net capital stocks in wholesale and retail trade are depicted in figure 2.4. It shows real growth in end-year capital stocks over the period 1959-60 to 1998-99. In recent years, end-year stocks in retail has overtaken wholesale stocks. Although capital services is the capital measure adopted for productivity calculations (see chapter 3 and appendix B), figure 2.4 suggests strong net growth in capital, especially in retail in the 1990s.

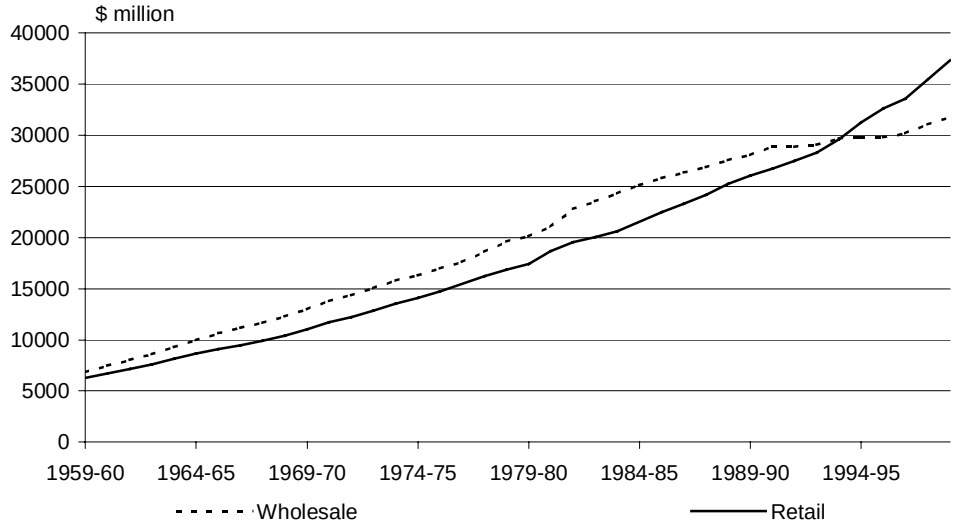
Figure 2.3 **Wholesale and retail trade, capital expenditure, 1984-85 to 1998-99**

1997-98 prices

Data source: Estimates based on unpublished ABS data.

Figure 2.4 **Wholesale and retail trade, real end-year net capital stock,[a] 1959-60 to 1998-99**

1997-98 prices



a Chain volume measure.

Data source: ABS Time Series Statistics Plus database on EconData.

Employment characteristics

Employment growth in the wholesale and retail trade sectors has outstripped that for the market sector as a whole. From 1978 to 1997, wholesale employment increased by nearly 30 per cent and retail employment by 35 per cent, compared with 20 per cent for the market sector as a whole (tables 2.2 and 2.3). Female employment increased strongly over the period, in keeping with broader market trends.

In 1997, employment in these sectors was around 1.7 million persons, up from around 1.2 million in 1978 (tables 2.2 and 2.3). In terms of total market sector employment, this represented an increase from around 30 per cent in 1978 to about 33 per cent in 1997.

Table 2.2 **Wholesale employment by gender, 1978 and 1997**

Gender	*1978*	*1997*	*Change in wholesale*	*Change in market sector*[a]
	'000	'000	%	%
Males	267.0	327.5	22.7	10.8
Females	96.3	144.3	49.8	43.8
Persons	363.3	471.8	29.9	20.1

[a] The market sector includes agriculture; mining; manufacturing; electricity, gas and water; construction; wholesale trade; retail trade; transport, storage and communications; accommodation, cafes and restaurants; and cultural and recreational services. Its share of employment was about 61 per cent in 1997.

Source: Derived from Barnes et al. (1999, table 3.1).

Table 2.3 **Retail employment by gender, 1978 and 1997**

Gender	*1978*	*1997*	*Change in retail*	*Change in market sector*[a]
	'000	'000	%	%
Males	466.7	588.5	26.1	10.8
Females	418.0	608.7	45.6	43.8
Persons	884.7	1 197.2	35.3	20.1

[a] See note in table 2.2.

Source: Derived from Barnes et al. (1999, table 3.1).

There are striking differences in the composition of employment in the wholesale and retail trade sectors.

- The proportion of employees with post-school qualifications is much higher in wholesale than in retail (and the market sector). And, whereas between 1984 and 1997 the share increased for wholesale, it declined slightly in retail (table 2.4).

- The proportion of casual employees is significantly higher in retail at nearly 47 per cent in 1997, compared with around 16 per cent in wholesale (table 2.4). For the market sector, the corresponding share was around 30 per cent. The share of casual employees increased in both sectors over the period.
- The share of part-time employment has increased in the wholesale and retail sectors. However, for wholesale, the share is below the average for the market sector, whereas the converse applies for retail (table 2.5).
- The age profile of employees in the retail sector highlights its 'younger' workforce (table 2.6). In 1997, the proportion of employees in retail aged 24 years or less was nearly 40 per cent, compared with about 15 per cent in wholesale. For this age group, the share decreased in wholesale over the period (23 to 15 per cent) but grew in retail (from 36 to 40 per cent). This is consistent with the view that retail services increasingly can be provided by less skilled employees as a result of technological developments and a shift in functions across producers, the distribution sector and consumers (section 2.4).

Table 2.4 **Shares of wholesale and retail trade employment by education and employment status, 1984 and 1997**

Per cent

	Wholesale		*Retail*		*Market sector*	
	1984[a]	*1997*	*1984*	*1997*	*1984*	*1997*
With post-school qualifications[b]	38.2	44.5	29.7	28.4	38.1	40.2
Casual employees	9.8	16.2	32.6	46.5	17.1	29.9

a Casual/permanent status is for 1985. **b** 15-64 year olds.

Source: Derived from Barnes et al. (1999, tables 4.2 and 6.4).

Table 2.5 **Shares of part time employment in wholesale and retail trade, 1978 and 1997**

Per cent

	Wholesale		*Retail*		*Market sector*	
	1978	*1997*	*1978*	*1997*	*1978*	*1997*
Part-time employment share of total employment	9.0	13.4	26.2	45.5	14.1	24.1

Source: Derived from Barnes et al. (1999, table 6.2).

Table 2.6 **Employment shares in wholesale and retail trade by age, 1978 and 1997**

Per cent

	Wholesale		*Retail*	
	1978	*1997*	*1978*	*1997*
15-19	8.7	3.2	22.9	23.5
20-24	13.8	11.5	13.4	16.3
25-34	25.8	29.0	22.1	20.5
35-44	20.8	26.5	18.8	17.5
45-54	18.3	20.7	13.8	15.5
55-59	7.0	4.8	5.2	3.7
60+	5.6	4.3	3.8	3.0
All ages	100.0	100.0	100.0	100.0

Source: Derived from Barnes et al. (1999, table 5.2).

Hours worked is the 'labour measure' used in productivity calculations (see chapter 3). This takes into account shifts in the incidence of casual and part-time employment, but does not account for changes in skill levels. Higher skill levels tend to translate into higher (measured) productivity.

Capital-labour intensities

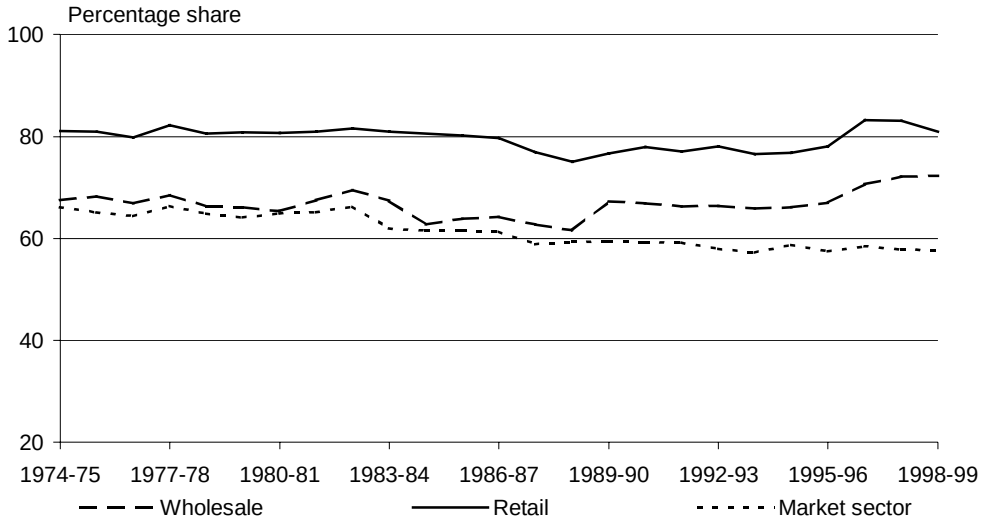
Investment (and capital stock) and employment in wholesale and retail trade has been increasing — albeit that the composition of employment has changed.

One indicator of capital intensity is the net capital stock per hour worked. In the period from 1985-86 to 1998-99, the real (end year) net capital stock per hour grew at different rates, from around $30 to $31 for wholesale trade — an average annual growth rate of 0.3 per cent; $13 to $18 for retail trade — an average annual growth rate of 2.2 per cent; and $57 to $70 in the market sector — an average annual growth rate of 1.6 per cent (based on ABS Time Series Statistics Plus database on EconData and unpublished ABS data).

The share of payments to labour and capital in the wholesale, retail and market sector over 1974-75 to 1998-99 is depicted in figure 2.5. Labour income is measured as the total compensation to labour in the form of wages, salaries and supplements and also employer's social contributions, such as workers' compensation premiums. Capital income is defined as the gross operating surplus (income earned before depreciation, interest and taxes) earned by capital. Across the three sectors, the share of payments to labour have been higher than for capital. The

retail trade sector has the highest share of labour payments, reflecting its comparative labour intensity.

Figure 2.5 **Labour share of total capital and labour income for wholesale and retail trade and the market sector, 1974-75 to 1998-99**



Data source: Estimates based on unpublished ABS data.

Profitability

Australia's distribution sector appears to be, on the basis of industry profit margins, highly competitive. Wholesale and retail trade have the lowest profit margins of all Australian industries — a selection of which is listed in table 2.7. It is apparent that profit margins in the distribution sector are well below the 'all industries' average throughout the period 1990-91 to 1997-98.[1] This, in part, reflects the different risk profiles of the industries.

[1] The construction industry also has a relatively low profit margin — 4.6 per cent in 1997-98.

Table 2.7 **Selected industry profit margins, 1990-91 to 1997-98**
Per cent

	1990-91	*1991-92*	*1992-93*	*1993-94*	*1994-95*	*1995-96*	*1996-97*	*1997-98*
Agriculture	12.6	10.8	15.7	18.6	12.7	14.4	11.7	14.1
Mining	19.5	14.5	16.4	16.0	16.8	17.6	17.9	13.3
Manufacturing	6.6	5.1	9.9	8.1	8.0	6.6	6.1	6.1
Wholesale	**2.4**	**1.3**	**2.5**	**2.7**	**4.1**	**3.6**	**3.2**	**2.8**
Retail	**2.1**	**1.4**	**2.9**	**3.0**	**4.2**	**2.6**	**2.7**	**3.4**
All industries	7.1	6.0	8.7	9.3	9.3	9.2	8.6	9.0

a The percentage of operating income available as operating profit. That is, OPBT * 100/operating income.

Source: ABS 8140.0.

Wholesale trade — sectoral contributions

From the 1991–92 ABS wholesale industry survey, the latest year for which comprehensive and disaggregated data are available, total wholesale trade had a turnover of over $140 billion and output (measured as gross product) of around $16.7 billion.

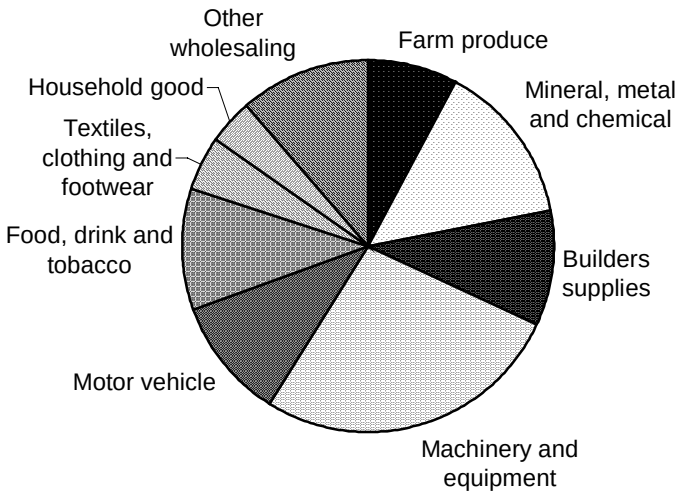
The shares of total industry gross product for wholesale trade in 1991-92 (at the ANZSIC 2-digit subdivision level) were:

- Basic materials, 32 per cent — comprising Farm produce, Mineral, metal and chemical products and Builder's supplies;
- Machinery and motor vehicles, 37.5 per cent — comprising Machinery and equipment, and Motor vehicles; and
- Personal and household goods 30.5 per cent — comprising Food, drink and tobacco, Textiles, clothing and footwear, Household goods and Other wholesaling.

An illustration of the relative contribution of the wholesale trade groups (at the ANZSIC 3-digit level) is provided in figure 2.6.

At this level, some important elements of the story are masked. For example, further disaggregation (see chapter 4) reveals the important contribution made by individual industry classes (4 digit ANZSIC level), such as petroleum products (around 10 per cent) and computers (around 7 per cent).

Figure 2.6 **Shares of wholesale gross product, 1991-92**
ANZSIC 3-digit group



Data source: ABS 8638.0.

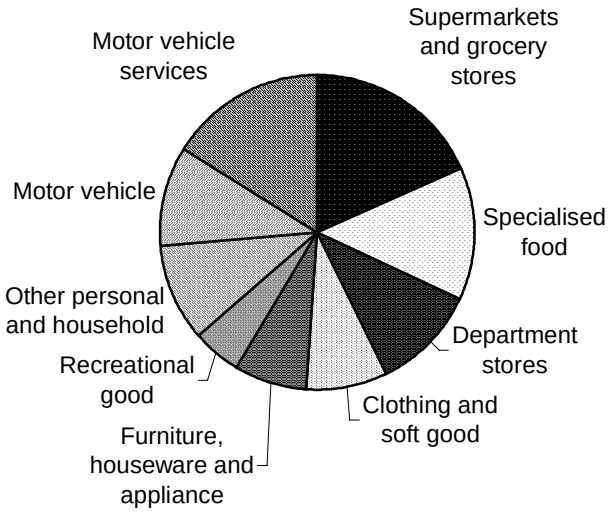
Retail trade — sectoral contributions

From the 1991-92 ABS retail census, total retail turnover was around $114 billion and output (gross product) amounted to $18.1 billion. The ABS classifies the sector into three subdivisions (ANZSIC 2-digit) with the following shares of gross product:

- Food, 31.7 per cent — comprising Supermarket and grocery, and Specialised food;
- Personal and household, 42 per cent — comprising Department stores, Clothing and soft goods, Furniture, houseware and appliances, Recreational goods, Other personal and household, and Household equipment repair; and
- Motor vehicle retailing and services, 26.3 per cent — comprising Motor vehicle retailing and Motor vehicle services.

An illustration of the relative contribution of these retail trade groups is provided in figure 2.7. More disaggregated data at the ANZSIC class level are presented in chapter 5.

Figure 2.7 **Shares of retail gross product, 1991-92**
ANZSIC 3-digit group



Data source: ABS 8625.0.

2.3 The changing role of the distribution sector

This section considers factors which affect the environment in which the wholesale and retail trades operate. Rather than being an exhaustive treatment, the discussion aims to give a flavour of some key drivers of, and sectoral responses to, change.

These developments are set against a backdrop of competition as a driving force affecting the performance of the distribution sector. As noted in section 2.2, the distribution sector operates on relatively tight margins. And, as labour intensive industries, they are vulnerable to wage increases. Faced with cost pressures and consumer resistance to increased prices, the wholesale and retail trade sectors need to rely on some combination of cost containment and/or increased productivity to maintain or improve their profitability.

The changes affecting the sector derive from diverse sources such as technological advances, shifts in government policy initiatives and, importantly, striking changes in people's incomes, lifestyles and preferences. To understand how these developments affect the distribution sector, it is useful, initially, to canvass the operation of the sector and how its functions have evolved.

Functions and relationships in the distribution sector

The inter-relationships between producers, the distribution sector and consumers is an important feature of activity in these sectors. Changes in one sector can flow through directly to others. For example, if producers increase advertising about their goods (and supply warranties), this can reduce the need for retailers to provide as many sales assistance staff to give customers detailed product information. Similarly, search costs for consumers are also reduced as producers take on more of the information role from retailers. Thus, changes in one sector can flow through directly to other sectors.

Nowhere is the importance of these interactions more evident than between consumers and retailers. As discussed below, the transfer of some functions between these groups has had a major bearing on the role and development of the distributive trades.

As noted at the outset, wholesalers and retailers operate on margins between ex-factory, wholesale and retail prices. In facilitating transactions, retail firms supply a bundle of services (see Oi 1988) such as:

- exchange — transactions that transfer property rights to the goods they handle;
- a product line — assembling and displaying an array of goods and supplying product information;
- convenience — offering a product line at a location and times (store hours) in a manner that reduces transaction costs;
- ancillary services — providing delivery, credit and implicit warranties; and
- production — packaging and processing goods in a suitable form for consumers.

Consumers allocate time and money to shopping. For instance, shopping costs include searching for information about prices and qualities, locating the appropriate store and carting and storing consumable goods.[2] Thus, where, say, a retailer reduces (increases) the number of store locations, shop assistants or checkout lanes, the costs for consumers can increase (decrease). This interplay is most apparent where customer labour is substituted for retailers' labour, as has occurred with self-service petrol stations.

The distribution sector is characterised by a role for consumers as 'inputs' and the 'bundled' nature of services that accompany output. It is against these traits that

[2] Even though customers may pay the same retail price, they may confront different 'full prices' because, for example, a larger refrigerator and more cupboard space may increase the basket size resulting in fewer trips and a lower implicit buyer cost.

'drivers' of change acting on the sector (and the sector's responses) need to be understood. For example, an increasing cohort of 'time poor' consumers limits the scope for the distribution sector to cut costs if it inconveniences consumers.

Demand side drivers of change

The most apparent demand side trends reflect social and lifestyle changes. These include, for example:

- a significant rise in incomes and consumer purchasing power (see table 2.8);
- changes in consumer purchasing patterns (see figure 2.8) which reflect that, as societies become more affluent, the proportion of income spent on basic necessities declines — for example, purchases of food and clothing have not changed significantly in response to changes in prices or incomes, whereas the demand for many services (for example, education, travel and personal services) has risen more than proportionately with income);
- an increase in the participation rate of women in the workforce and, hence, the proportion of dual income households;
- an increase in single parent households;
- greater availability of consumer credit; and
- more reliable and affordable cars, refrigeration and larger houses (hence, storage capacity) which have altered consumer purchasing patterns (the way consumers purchase many goods).

The interaction of these factors has given rise to new patterns of consumer demand. Demand for combined shopping/entertainment activities and access to shops outside normal working hours have increased accordingly.

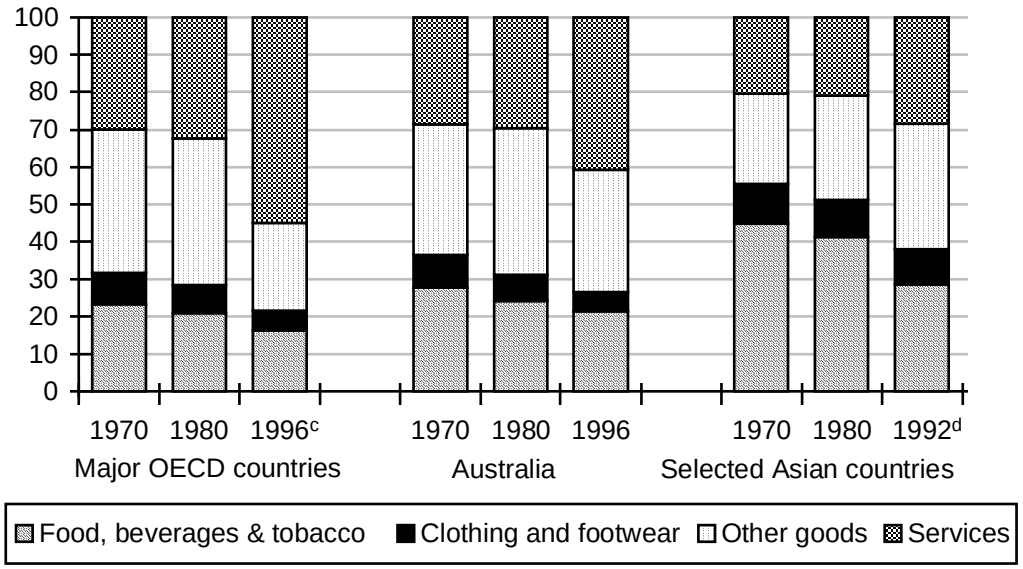
Table 2.8 **Real private consumption, 1961 to 1996**
$, 1989-90 prices

Year	*Real private consumption per person*
1961	6 840
1976	10 213
1981	11 087
1986	11 923
1991	12 721
1996	14 278

Source: IC (1997a, table A1).

Figure 2.8 **Consumer spending patterns in Australia, selected major OECD countries[a] and Asian countries,[b] 1970, 1980 and 1996**

Shares of private consumption spending by type



a The US, France, Germany (West), Italy and the UK. Canada is excluded due to lack of data. **b** Hong Kong, Singapore, Thailand and South Korea. **c** Excludes Germany (West). **d** Data for 1996 not available.

Data source: UN (1996).

The changing face of the wholesale trades

The following sections deal mainly with the manner in which retailers have responded to the many and varied drivers of change. This essentially is because changes at the 'consumer-retailer interface' are the most apparent manifestation of change.

However, less obvious, is the 'quiet revolution' which has transformed the way wholesaling businesses now operate. While this is covered in detail in chapter 4, some of the key developments are briefly summarised here.

For the wholesale sector as a whole, there has been an impressive uptake of new productivity-enhancing technologies in the 1990s and also greater penetration of older technologies such as electronic data interchange. The use of warehouses as places to store inventory is declining. The emphasis has switched to more centralised flow-through distribution centres with automated stock replenishment systems. Some modern warehouses now utilise cross-docking (that is, moving goods across the docks of the distribution centre rather than storing them inside) and the minimisation of double handling and reductions in labour content through, for example, paperless picking systems is becoming common. Stock-takes that now

take one or two people a few hours may in the past have occupied a team for days or even weeks (see chapter 4).

Innovation and shifting functions in retailing

Innovation in goods producing firms is typically manifested as *improved product* (for example, cars with six speaker CD systems and climate control), whereas innovation in the distributive trades is often through changes in *organisational form* aimed at better matching the combined resources of customer and seller. Often such developments are inextricably linked to the degree of competition in the distributive trades and government policies such as those which restrict trading hours.

Many innovations in retailing can be viewed as much as competitive responses to change as drivers in their own right. For example, where permitted, shop trading hours have increased to accommodate lifestyle changes. Perhaps the most apparent is the development of the 24 hour retail outlet, including the expansion of retail functions, for instance, in petrol stations. For some retailers, unless accompanied by a commensurate increase in sales, longer trading hours can mean that capital and labour are used less intensively. For other niche retailers — such as all-night convenience stores — extended trading is an imperative rather than a response.

There is a trend to combine activities such as grocery shopping with other types of shopping, say for clothes, and/or some form of entertainment such as a meal, movie or an amusement. This is most evident in shopping malls — the Mall of America, near Minneapolis in the United States, has an 18 hole miniature golf course, a 14 screen cinema complex, 13 restaurants, two food halls, an aquarium and a 2.8 hectare amusement park with 23 rides (Clemenger 1995).

An increase in product range is another consequence of rising real incomes and the cost of the consumer's time, but also reflects the benefits retailers can derive through economies of scale and scope. For example, supermarkets have consolidated the sales of groceries, meat and household items. As stores become larger they handle more products and introduce new departments such as bakeries, florists and delicatessens. The emergence of mega-retailers of electrical products, furniture and other household goods is a further response to these time and income pressures. As the rising cost of shopper's time induces customers to buy a range of goods in one store, stand alone greengrocers, butchers, bakeries and delicatessens may suffer, although many are responding by catering for 'niche markets' — for example, butchers selling marinated meats, seasoned roasts and gourmet sausages.

Another manifestation of the need for retailers to increasingly provide products and services which cater to income-rich and time-poor consumers are changes in shop

layouts. For instance, many supermarkets have designed quick 'in-out' areas where customers can access fresh fruit and delicatessen products in one area, with that evening's meal in mind, before proceeding to an express check out area.

Lifestyle changes are also reflected in the design of products and services to cater for differences in consumer characteristics. Retailers have segmented the market according to income, age, sex, lifestyle, ethnic identification and leisure — for example, sport and lifestyle retailers specialise in branded apparel and sporting equipment.

As suggested above, a shift in functions from retailers to consumers also has been evident. Traditional roles of stores providing credit, whilst still prevalent in more 'up-market' chains, has declined with the advent of personal consumer credit (for example, credit cards and increased competition in the banking sector). Similarly, point of sales assistance is declining in many of the mega-store and discount variety retailers that operate on high volumes and tight margins.

In addition, many of the functions that were previously performed by retailers have been shifted backward to producers. For example, department stores have shifted part of the store's reputation for assuring product quality to manufacturers of branded goods. National advertising of standardised brands (assisted by warranties) has lowered search costs for customers, who now have less incentive to inspect goods.[3]

It appears that, as a consequence of organisational change and shifts in functions, retail services now can be more economically produced by fewer and less skilled employees. This is likely to have resulted in retail staff having less store specific human capital such as product knowledge. This would be consistent with:

- shifting costs to consumers in the form of reduced sales assistance staff; and
- reducing the cost of providing services by increasing casualisation rates and/or the proportion of junior staff on lower wages — this is supported by the data presented in section 2.3 (refer tables 2.6 and 2.7).

Many of these organisational (or innovation) responses are likely to continue, but there are some constraints.

On the supply side, locational convenience and government policies may act as a brake on the way the distribution sector responds to change. The combination of trends for larger transaction sizes and economies of scale have encouraged the

[3] Conversely, some supermarkets, such as Woolworths, have extended their product range into fruit and vegetables, where brand name is not particularly strong. In this instance, it has used its own reputation as a marketing tool.

development of large supermarkets and mega-retailers in furniture, electrical, toys and hardware (Appel 1972). These types of retail outlets are often located outside densely populated areas, where low rents enable them to acquire large selling areas and to provide convenient parking space. In some respects, this represents a balancing act as the cost advantages enjoyed by the large stores have to be set against costs incurred by customers who have to travel longer distances.

Government regulations affecting trading hours are also important — for instance, weekend trading is clearly important for more 'far-flung' retail establishments (see section on government influences below).

On the demand side, the growth of Internet commerce and home shopping has the potential to break down long established distribution chains. This is taken up next.

Technological change

Competitive pressures have encouraged firms to improve productivity by adopting electronic cash registers, scanning equipment and integrated computer systems. This has facilitated better inventory control, improved customer service at the check-out and reduced labour in pricing stock.

In the retail sector, scanning allows pricing and repricing without marking individual goods, resulting in substantial cost savings (Stanback 1990). The technology also permits a store to feed competitors' prices into the system for repricing when its policy is to match the competition. Firms have improved profitability through computer systems which support functions at headquarters, distribution centres and individual stores. Distribution and sales can be synchronised to permit automatic replenishment, resulting in major savings in inventories (Stanback 1990).

Retailers and wholesalers can increasingly use technology to optimise sales. For example, the rapid transmission of sales information about particular items to producers allows them to better match production to consumer demands. Inventories can be more closely matched to demand, which in turn can reduce the need for mark-downs and sales.

With the increased adoption of computer systems, managerial responsibility and organisational arrangements have changed (Stanback 1990). Store managers are largely relieved of the responsibility of making purchasing decisions and maintaining stock records, and have more time for overseeing operations. Higher level managers now assume greater responsibility for purchasing and also advertising, merchandising and making store location and design decisions.

Technology-driven progress and its impact on factor prices has the potential to further alter the allocation of distributive functions among the various participants. For instance, reductions in the prices of communication and transport and, importantly, new developments such as self-scanning and interactive television ,will affect the structure of the distributive trades.

Although much of the preceding discussion has focussed on the interface between consumers and retailers, corresponding changes have also occurred in the wholesaling sector. For example, computerised warehouse inventory control systems and Internet and facsimile ordering have streamlined operations.

The advent of electronic commerce and the Internet has the potential to further alter the make-up of the distributive trades. Entry barriers to electronic commerce are relatively low and this can allow the Internet to bypass elements of the distributive trades. Indeed, there is an increased capability to move back to the direct relationships that occurred in the past between producers and consumers (disintermediation). And, these developments are not confined to relationships between producers and consumers. They also extend forwards and backwards, between businesses (for example, retailers to producers and wholesalers to producers). These developments are germane also for backward vertically integrated retailers. Already, Woolworth's Homeshop and Coles On-line are available in some urban areas.

A recent study of the Australian services sector (ASN and Allen Consulting 1999, p. 58) reported that electronic commerce is:

- Changing the cost trade-offs between tailored and mass-produced goods and permitting interaction with customer requirements. As a result of greater integration within supply chains, the value added chain is becoming a systemic, rather than linear, value added business network;
- Allowing buyers and sellers to cut out retail and wholesale margins (disintermediation). Re-intermediation may occur as new types of intermediaries are introduced to the value added chain; and
- Allowing firms to extend 'just in time' processes to reduce inventories and other input costs. It may also streamline purchasing and orders processing systems reduce the cost of processing sales in a way that should improve productivity (see chapter 4).

In the same way that refrigeration and more reliable and affordable cars changed the relationship between producers, distributors and consumers in the past, electronic commerce has the potential to alter these relationships in the future.

Government influences

Longer trading hours are a response to demand by consumers for greater convenience. The main drivers are changing social and work patterns such as increases in dual income households and more flexible and longer working hours (see PC 1999a and NCC 2000). In many instances, this has necessitated government action to remove restrictions on trading hours. Indeed, community pressure has been a major factor behind the deregulation of trading hours. For instance, the ACT conducted a trial to restrict trading hours in 'town centre' supermarkets in an effort to assist smaller retailers in local shopping centres. The trial was abandoned after studies found that consumers' shopping habits had changed little and there was broad community opposition to the restrictions.

The Victorian Government, in a case study of trading hours reform provided in a submission to a Senate Committee on National Competition Policy, noted that:

> ABS retail figures for the 1990s indicate that, after lagging the rest of Australia from 1991 to 1996, retail sales in Victoria since deregulation in December 1996 have grown strongly, faster than any other State and at around twice the rate than the rest of Australia. The pick-up in Victorian retail trade growth occurred at virtually the same time as the shop trading reforms were implemented. … the strong growth experienced in Victoria since December 1996 would suggest that the 1996 reforms have had a strong positive influence. (Victorian Government 1998, p. 17)

These changes have required a major response from retailers. Coles and Woolworths each claimed to have employed an additional 2000 staff in Victoria to meet the demands of longer trading hours (PC 1999a, p. 259). Such gains, however, need to be considered in the context of employment losses by small retailers.

Progressive deregulation of trading hours and regulations which reserve certain goods and services to certain providers, such as newsagents, pharmacists and hotel bottle shops, are examples of government policies which bear directly on the environment in which the distribution sector operates. These policies have been subject to close scrutiny, owing to National Competition Policy requirements to review legislation that restricts competition. The impact of longer trading hours on productivity is explored in chapter 5 and appendix B.

Other more broad ranging changes also can have a major impact on the sector. For example, reforms affecting the provision of transport and communications are clearly important for distributive trades. Likewise, changes in labour market institutional arrangements, such as an increasing emphasis on enterprise agreements, rather than industry based awards, can change the relative costs of permanent, part-time and casual staff (see chapter 5).

Commonwealth, State, Territory and local government policies affecting land use and zoning are also important direct influences on the distributive trades (and, indeed, for producers). Governments' roles as providers of infrastructure (for example, roads) are also major influences on the sector. More generally, increasing competition in the economy from trade and microeconomic reforms are relevant. Finally, health and hygiene standards (for example, governing storage and handling of perishables), occupational health and safety requirements, and product labelling regulations can also affect costs in the distributive trades.

2.4 Assessing productivity

The production function, which refers to a technical relationship describing how inputs of labour and capital can be transformed into an output, provides the framework for productivity analysis. In this respect, there are characteristics of the distribution sector which can bear on the estimation of productivity — for example, output can be a mix of services and there can be some interchangeability between retail and customer 'labour inputs'.[4] Another issue is the nexus between (measured) productivity improvements and welfare.

Three scenarios illustrate the importance of the interaction between consumers and retailers for productivity analysis and also highlight some welfare effects.

1. The traditional role of petrol stations has changed over time. More reliable cars, technological changes and longer warranties have shifted elements of car repair and service work from petrol stations to car dealers. Petrol stations found that mechanics, who used to pump fuel and repair cars, could be replaced by less skilled workers. Self-service operations were also introduced. Since only employed labour is counted, this substitution of customer labour for employees increases measures of labour productivity.
2. Technological change can reduce shopper inputs. For instance, improved checkout practices result in time savings for consumers. If no additional costs are incurred by the retailer in making such improvements, then the outcome may be reduced shopping time for customers, with no change in sales, gross margins or inputs. Thus, measured productivity will not change, even though there is a gain for consumers (Acheson and Ferris 1988, p. 41).
3. Some retail stores, in an attempt to increase custom, provide free parking and raise margins accordingly. If local customers (who walk to shop) continue to patronise such stores, and new shoppers with vehicles also patronise the stores,

[4] Oi (1994) goes so far as to formalise this into a production function for retail trade such that output = f(L, K, N), where N represents consumers.

then the quantity of sales rises. The local shoppers, however, pay more for no benefit (Acheson and Ferris 1988, p. 43).[5]

In scenario 1, productivity rises, but there is a decrease in quality (with potential price benefits) because consumers have to do 'more work' — unless they opt to use a petrol station with driveway service. In scenario 2, productivity does not change, but consumers are better off from the quality/convenience improvement. In scenario 3, productivity rises, but the 'quality improvements' have differential impacts depending on the circumstances of the individual consumer so that some are 'worse off' and some 'better off'.

The scenarios highlight difficulties associated with separating quality/convenience changes from price and volume changes. This is discussed extensively in appendix B, along with a range of measurement related issues. The scenarios also suggest that productivity estimates may not necessarily be good measures of economic welfare effects. Others, such as Lowe (1995), have raised similar issues (see box 2.1).

In essence, Lowe (1995) shows that productivity measures, at the firm or sectoral level, may not reflect changes in service quality or consumer welfare. Indeed, it is possible to envisage many other such situations — for example, deregulation of the taxi industry would result in a significant improvement in economic welfare (see PC 1999c) but, for the taxi industry, measured productivity would fall sharply.

That said, in terms of the observations by Acheson and Ferris (1988) — that changes in the quality of retail services can impose welfare costs on some consumers — it needs to be recognised that consumers are, on the whole, free to make choices about which retail establishments they frequent, based on their own assessments of the varying mixes of prices, convenience and service quality. They are the best judges of determining which price-quality combination enhances their welfare. In the long-run, goods and services are provided on the basis of consumers' willingness to pay.

More importantly, Acheson and Ferris (1988) describe 'first round' effects. Links between productivity and welfare should be considered from an economy-wide perspective. In this context, productivity growth, by reflecting a more effective use of a nation's resources, provides the capacity for improvements in living standards and community welfare (even in the presence of some 'losers').

[5] Acheson and Ferris (1988, p. 43) contend that, in this instance, 'the increment in sales weighted by the prices takes no account of the damages and therefore provides a distorted view of real output and productivity'. Of course, on the other side of the ledger, free-riding is also an issue where customers examine goods, obtain information from staff, enjoy the ambience and air-conditioning and then purchase the item from a competitor, perhaps through the Internet.

Box 2.1 **Productivity, welfare and the deregulation of trading hours**

Trading hours have been liberalised throughout Australia. Deregulation has led to an increase in average opening hours in Australia from 52 hours per week in the early 1980s to 61 hours in 1992 (Kiel and Haberkern cited in Lowe 1995).

Given that these changes reflect community desires stemming from major changes in lifestyles and incomes, it is not surprising that the welfare benefits from deregulation of trading hours are significant. Longer hours allow consumers more time to make their choices and enhance the 'entertainment' value of shopping' (Pilat 1997). Brooker and King (1997) estimated that the welfare benefits of an additional 5 hours trading per week in Victoria were around $300 million in 1995-96.

Of course, deregulation of trading hours can impose costs on some small retailers that formerly relied on less competition outside of the previously restricted trading hours.

For retail firms, it is likely that, in aggregate, longer trading hours have not led to a significant increase in merchandise sales. Lowe (1995, p. 94) notes:

> While deregulation is unlikely to have led to more goods being processed through the checkout (the standard measure of output), it certainly made shopping more convenient. While statisticians attempt to make adjustments for improvements in the quality of goods, no adjustments are made for improvements in the quality of services.

However, the large supermarkets chains may have increased their share of sales (and output at the expense of smaller convenience stores.

3 Overview of productivity trends

This chapter presents an overview of productivity growth trends in the wholesale and retail trade sectors and identifies the main output and input growth patterns underlying the trends. The purpose is to highlight particular periods of change in productivity performance for further analysis in chapters 4 and 5.

3.1 Measurement of sectoral productivity

While the ABS releases productivity estimates at the aggregate level, it does not produce a full set of sectoral productivity estimates. It publishes sectoral labour productivity estimates but does not publish sectoral estimates of multifactor productivity (MFP).

Box 3.1 **What is productivity growth?**

Productivity is the ratio of output produced to inputs used. It can be measured in relation to a single input such as labour or capital (a partial measure) or several inputs (multifactor productivity).

Productivity growth is the amount of output growth in excess of input growth over a specified period. For example, if output grew by 5 per cent a year over a five year period and inputs grew by 3 per cent a year, productivity growth would be 2 per cent a year.

Labour productivity is estimated in this paper as the ratio of output to hours worked over a given year. Capital productivity is estimated as the ratio of output to capital inputs (capital services measure). Multifactor productivity is calculated as the ratio of output to inputs of labour and capital.

Sectoral MFP estimates have been published by the Productivity Commission (for example, PC 1999b) using sectoral data on output, hours worked and capital input provided by the ABS. These estimates are extended and updated in this paper. A revised ABS capital input series for 1964-65 to 1998-99 has been used. The ABS provided an hours worked series from 1985-86. This was extended back to 1974-75, based on the estimates of Gretton and Fisher (1997).

The capital input series uses a capital services measure which differs from a capital stock measure. A major difference is that capital services is an economic measure and capital stock is a financial measure. Further details of the capital services measure are outlined in appendix B.

Measuring wholesale and retail trade output

The accuracy of productivity measurement in the wholesale and retail sectors has been questioned because of concerns about the measurement of output in these sectors. A specific concern is that the extra convenience provided by longer trading hours is not counted as extra output (for example, see Lowe 1995). This and other issues concerning the ABS methodology for estimating wholesale and retail output are discussed in more detail in appendix B.

The output of the wholesale and retail trade consists of two components — the transfer of ownership of goods and the provision of a range of services to secure a sale. These services include locational convenience for the transfer of goods, time convenience at which goods are available for sale, the time taken to execute the transfer, the range of products on offer and the extent and quality of customer assistance (chapter 2).

Conventionally, the service components are not measured directly. Rather, gross output is measured when a sale occurs as the margin on goods traded — that is, the difference between the value of sales and the cost of goods sold. This methodology assumes that the output of services increases in proportion with the volume of goods sold.

The extension of trading hours has been put forward as a prime example of services that do not vary directly with the volume of sales. Prima facie, it appears that measured output fails to capture the increase in service because the volume of goods sold does not increase in proportion to the additional convenience — consumers shift the timing of purchases, more than the volume of purchases.

However, longer trading hours involve additional labour costs and, other things equal, these increase the sales price and the gross margin, registering an output increase. Provided costs are proportional to service, there is no mismeasurement of output.

In practice, competition constrains opportunities to raise prices and margins and an improvement in one service may only be possible by a decrease in another service. For example, the labour cost of opening longer hours may be met by reductions in customer service, forcing increased customer self-service. Growth in measured output would still capture growth in actual output.

While changes in trading hours may not be a major source of error in output measurement, there are other potential sources of error (see appendix B). These are:

- economies of scale (output growth not proportional to increases in costs);
- the ABS assumption of fixed value added to sales ratios over time when a number of operational factors have been changing (for example, changes in sales mixes and outsourcing some functions); and
- the ABS practice of tying the value added of computer wholesaling to the volume of sales of computers which reflect substantial quality improvements, rather than the margin between the sale price and purchase price of goods.

The ABS has made changes to its methodology in recent years to reduce the potential scope of some sources of error. For the years from 1994-95, it has used its supply and use tables to provide a more accurate measure of wholesale and retail value added. The method of calculating computer wholesale value added has been revised for the years from 1996-97.

Not withstanding these changes, possible sources of measurement error suggest the need for some caution in the interpretation of productivity estimates for wholesale and retail trade, especially where negative productivity trends are recorded over long periods of time.

3.2 Multifactor productivity growth in the wholesale and retail trade sectors

Tables 3.1 and 3.2 show estimates of sectoral productivity growth and contributions to market sector productivity growth. The sub-periods are defined by the ABS according to cycles in market sector MFP. The start and end points of each cycle correspond to a productivity peak in aggregate MFP. These do not always coincide with the productivity cycles of individual sectors.[1] As a result, actual estimates of productivity growth for industry sectors over market sector cycles may give a misleading impression of their underlying rates of growth. However, trend estimates (obtained with a Hodrick-Prescott filter) reduce the effects of poor 'cycle matching' and facilitate inter-sectoral comparisons of productivity growth in selected periods.[2]

[1] For example, figure 3.1 suggests that the peak-to-peak cycles for wholesale trade were 1975-76 to 1981-82, 1981-82 to 1988-89, 1988-89 to 1994-95 and 1994-95 to 1998-99.

[2] In principle, actual and trend growth estimates should be similar over long periods such as the 24-year period considered here. Only actual estimates for the whole period are presented in tables 3.1 and 3.2. Trend estimates are not presented for the Market sector in these tables because the sub-periods are defined as peak-to-peak cycles and the actual estimates reflect underlying productivity growth.

Table 3.1 shows variable MFP growth performance between industry sectors. One group of industries (Agriculture, Manufacturing, Electricity, gas and water, Transport and storage and Communication) sustained significant MFP growth between 1974-75 and 1998-99. In contrast, average annual growth was low or negative for a large group of industries, including the wholesale and retail sectors.

Table 3.1 **Multifactor productivity growth by sector, 1974-75 to 1998-99[a]**
Per cent

	1974-75 to 1981-82		*1981-82 to 1984-85*		*1984-85 to 1988-89*		*1988-89 to 1993-94*		*1993-94 to 1998-1999*		***1974-75 to 1998-99***
	Actual	*Trend*	*Actual*	*Trend*	*Actual*	*Trend*	*Actual*	*Trend*	*Actual*	*Trend*	*Actual*
Agriculture	2.3	1.0	2.7	1.0	-0.9	1.3	3.0	2.0	3.3	2.9	**2.2**
Mining	-3.7	-1.6	6.0	0.6	2.5	2.6	1.9	2.6	0.8	1.6	**0.6**
Manufacturing	2.3	2.1	1.9	1.7	1.4	1.6	1.8	1.4	0.3	1.0	**1.6**
Electricity, gas and water	2.0	1.7	0.9	2.6	4.3	3.7	4.2	3.4	0.2	2.0	**2.3**
Construction	2.5	1.1	-0.8	-0.1	-1.0	-0.8	-0.6	-0.2	2.6	1.5	**0.9**
Wholesale trade	**0.1**	**-1.2**	**-3.0**	**-1.6**	**0.4**	**-1.0**	**-1.6**	**1.1**	**5.8**	**3.2**	**0.6**
Retail trade	**0.8**	**0.8**	**2.4**	**0.3**	**-3.0**	**-0.5**	**0.2**	**-0.1**	**1.3**	**0.8**	**0.3**
Accomm., cafes and restaurants	-0.8	-1.2	-2.9	-1.8	-2.5	-2.4	-2.2	-2.0	0.7	-0.7	**-1.3**
Trans. and stor.	2.7	2.1	1.1	1.1	0.7	0.9	0.6	1.3	1.9	1.7	**1.6**
Communication	6.2	6.9	3.1	5.5	5.0	5.4	6.8	5.3	3.7	4.3	**5.2**
Finance and insur.	-3.1	-2.3	-1.3	-1.2	1.6	0.1	0.0	1.2	3.1	2.0	**-0.2**
Cultural and recr. Services	-0.9	-1.5	-1.8	-1.8	-2.8	-1.9	-1.3	-1.9	-3.1	-2.6	**-1.9**
Market sector	1.0		0.6		0.4		0.5		1.7		**0.9**

a The trend estimates are based on a Hodrick-Prescott filter (gamma = 100).

Sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Despite overall poor productivity performance, the wholesale sector achieved a dramatic improvement in MFP growth in the late 1990s. Between 1993-94 and 1998-99, trend MFP growth was 3.2 per cent a year. This was the second highest growth rate for any sector of the economy in that period.

MFP growth in the retail sector was more modest. Between 1993-94 and 1998-99, trend growth was 0.8 per cent a year. This was the highest productivity growth in the sector since the latter half of the 1970s.

Table 3.2 shows that actual wholesale MFP growth moved from largest negative influence on market sector MFP growth between 1988-89 and 1993-94 (-16 per cent) to the strongest contributor in the last half of the 1990s (27 per cent). The contribution of the retail sector increased from 2 to 6 per cent over the same period.

Table 3.2 **Sectoral contributions to market sector multifactor productivity actual and trend growth, 1974-75 to 1998-99[a]**

Percentage points and (per cent)

	1988-89 to 1993-94				*1993-94 to 1998-99*				***1974-75 to 1998-99***	
		Actual		*Trend*		*Actual*		*Trend*		***Actual***
Agriculture	0.2	(18)	0.1	(10)	0.2	(11)	0.1	(11)	**0.1**	**(13)**
Mining	0.1	(13)	0.2	(14)	0.1	(3)	0.1	(8)	**0.0**	**(3)**
Manufacturing	0.5	(54)	0.4	(34)	0.1	(5)	0.2	(16)	**0.5**	**(48)**
Electricity, gas and water	0.2	(21)	0.2	(14)	0.0	(0)	0.1	(6)	**0.1**	**(8)**
Construction	-0.1	-(7)	0.0	(-1)	0.3	(14)	0.1	(9)	**0.1**	**(9)**
Wholesale trade	**-0.1**	**-(16)**	**0.1**	**(9)**	**0.5**	**(27)**	**0.2**	**(17)**	**0.1**	**(6)**
Retail trade	**0.0**	**(2)**	**0.0**	**(-1)**	**0.1**	**(6)**	**0.1**	**(5)**	**0.0**	**(3)**
Accomm., cafes and restaurants	-0.1	-(9)	-0.1	(-7)	0.0	(2)	0.0	(-2)	**-0.1**	**-(5)**
Trans. and stor.	0.1	(7)	0.1	(10)	0.2	(10)	0.1	(10)	**0.1**	**(12)**
Communication	0.2	(23)	0.2	(14)	0.2	(9)	0.2	(12)	**0.1**	**(10)**
Finance and insur.	0.0	(0)	0.1	(11)	0.3	(18)	0.2	(13)	**0.0**	**-(1)**
Cultural and recr. Services	0.0	-(5)	-0.1	(-5)	-0.1	-(6)	-0.1	(-6)	**-0.1**	**-(5)**
Total	0.9	(100)	1.1	(100)	1.8	(100)	1.2	(100)	**1.0**	**(100)**

a The sum of contributions does not add to the published growth in market sector productivity due to the use of base-period weights. The differences in the total in this table and in published estimates are due to industry composition effects. The trend estimates are based on a Hodrick-Prescott filter (gamma = 100).

Sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Figure 3.1 shows the contrasting MFP growth experience in the wholesale and retail sectors. There appear to be two distinct periods of MFP growth for the wholesale sector. MFP declined over a long period from the mid-1970s to the early 1990s but increased and accelerated from the early 1990s to the late 1990s. Between these two periods, wholesale productivity MFP growth switched from being well below market sector MFP growth to being high relative to that of the market sector.

Figure 3.1 also shows why there is a difference between trend and actual growth rates reported in table 3.1. Wholesale trade productivity cycles do not match the market sector productivity cycles. For example, 1993-94 was a trough year for wholesale trade productivity but was a peak year for market sector productivity. As a result, the actual growth rate for wholesale trade from 1993-94 to 1998-99 is calculated from a trough year to a peak year and therefore gives too favourable a view of the underlying productivity growth.

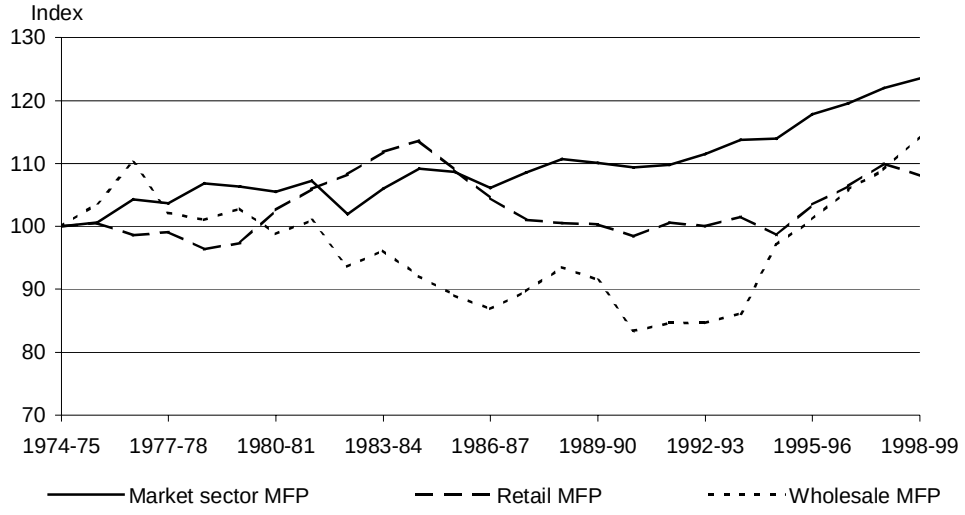
Three periods of MFP growth can be distinguished for the retail sector. MFP growth was above that of the market sector during first half of the 1980s. It then declined during the late 1980s and remained stagnant during the first half of the 1990s. During this period, market sector growth was positive. Retail growth improved

again in the late 1990s and was similar to that of the market sector, but was well below that of the wholesale sector.

This chapter seeks to examine the factors contributing to the different pattern of MFP performance of the two sectors. The following sections consider each sector separately in more detail. Trend estimates of MFP growth are used to determine the broad periods of interest while the discussion is couched in terms of actual growth rates over these periods.

Figure 3.1 **Multifactor productivity in wholesale, retail and market sector, 1974-75 to 1998-99**

Index 1974-75 = 100



Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

3.3 Wholesale trade productivity growth

The trend estimates of MFP shown in figure 3.2 show two distinct periods of wholesale sector productivity performance:

- declining MFP from the mid-1970s to the end of the 1980s; and
- steadily increasing MFP in the 1990s.

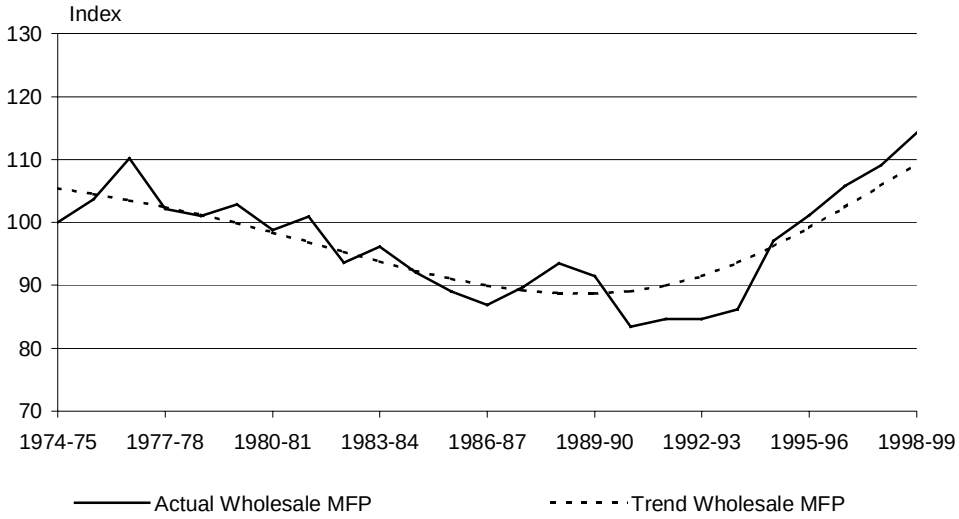
Actual growth in MFP in the two periods was -1.4 and 2.5 per cent a year respectively (table 3.3).[3] There were two distinct phases in actual MFP growth in

[3] Actual growth rates for the first period were estimated for 1976-77 to 1989-90 in order to capture a peak-to-peak cycle rather than a trough-to-peak cycle. Strictly speaking, 1989-90 is not a peak of the cycle but there is little difference between the level in this year compared to the peak in the previous year.

the 1990s. Growth was low between 1989-90 and 1994-95 and was below trend for much of the period but exceeded the trend rate between 1994-95 and 1998-99.

Figure 3.2 **Actual and trend wholesale multifactor productivity, 1974-75 to 1998-99[a]**

Index 1974-75 = 100 for actual MFP



a The trend estimates are based on a Hodrick-Prescott filter (gamma = 100).

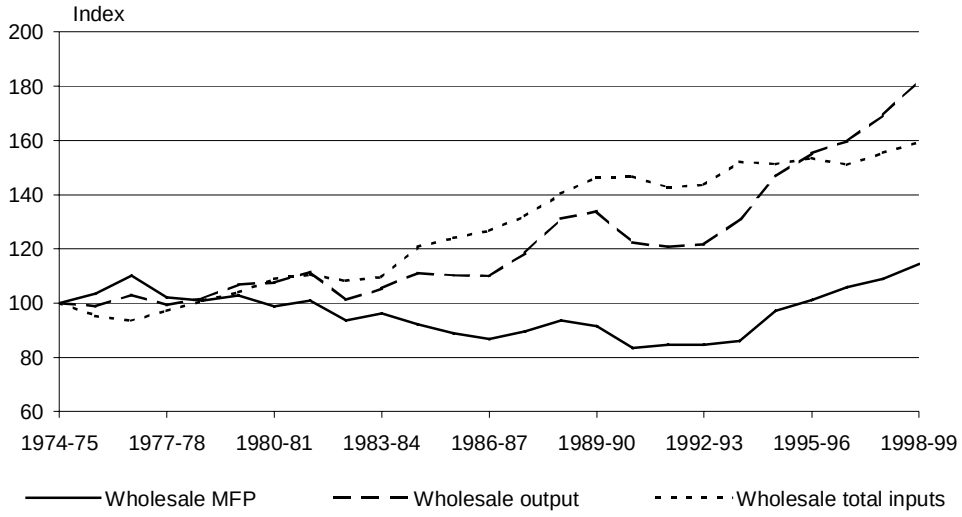
Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Output growth and input usage

Productivity is the ratio of outputs to inputs. It follows that changes in MFP may arise from changes in output, inputs or both. For example, increased MFP may result from increased demand that stimulates increased output through improvements in capacity utilisation and economies of scale without any change in total input usage. Alternatively, it may result from more efficient use of inputs to produce the same total output or increased output.

There was a stark difference in the pattern of output and input growth in the wholesale sector for the periods of declining and increasing MFP. Figure 3.3 and table 3.3 show that total input growth was higher than output growth during the period of declining MFP and that the pattern was reversed from 1989-90 when input growth was much lower than output growth. Actual growth rates for output and total inputs between 1976-77 and 1989-90 were 2.0 and 3.5 per cent a year respectively, compared with 3.5 and 0.9 per cent a year between 1989-90 and 1998-99.

Figure 3.3 **Inputs and outputs, wholesale, 1974-75 to 1998-99**
Index 1974-75 = 100



Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

The difference in the pattern of output and input growth between the 1980s and 1990s is also demonstrated by a comparison of the two periods of higher output growth shown in figure 3.3. Between 1985-86 and 1989-90, high output growth was accompanied by a similar rate of input growth. In contrast, high output growth since 1993-94 was achieved with very low input growth, indicating greater efficiency in the use of inputs.

Figure 3.4 shows that changes in total inputs in the wholesale sector are largely influenced by changes labour input growth, reflecting the high labour intensity of the sector. Table 3.3 shows that actual labour growth was higher than output growth between 1976-77 and 1989-90 but there was no growth in the 1990s despite high output growth. Trend capital input growth was strong for the whole period, but was significantly lower in the most recent period (3.0 per cent a year compared with 4.9 per cent a year in the earlier period).

Table 3.3 **Output and input influences on wholesale multifactor productivity growth, 1974-75 to 1998-99[a]**

Annual average growth rates, per cent a year

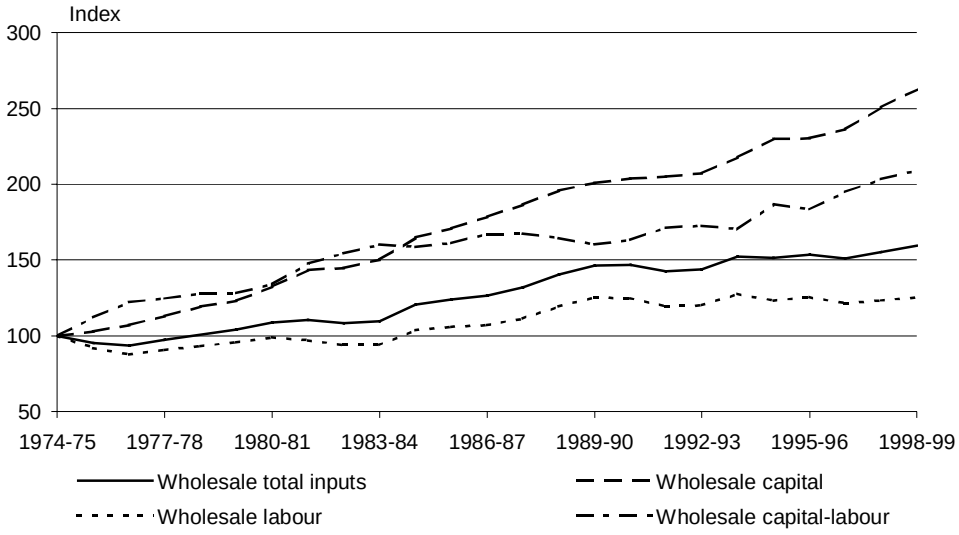
	1974-75 to 1989-90	*1989-90 to 1998-99*	*1976-77 to 1989-90*	*1989-90 to 1998-99*
	Trend	*Trend*	*Actual*	*Actual*
Output	1.5	3.9	2.0	3.5
Total inputs	2.7	1.5	3.5	0.9
Labour	1.7	0.8	2.8	0.0
Capital	4.9	3.0	5.0	3.0
Capital-labour ratio	3.1	2.2	2.1	3.0
Labour productivity	-0.2	3.0	-0.7	3.5
Capital productivity	-3.1	0.9	-2.8	0.5
Multifactor productivity	-1.1	2.3	-1.4	2.5

a The trend data were estimated using a Hodrick-Prescott filter (gamma = 100).

Sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Figure 3.4 **Inputs, wholesale, 1974-75 to 1998-99**

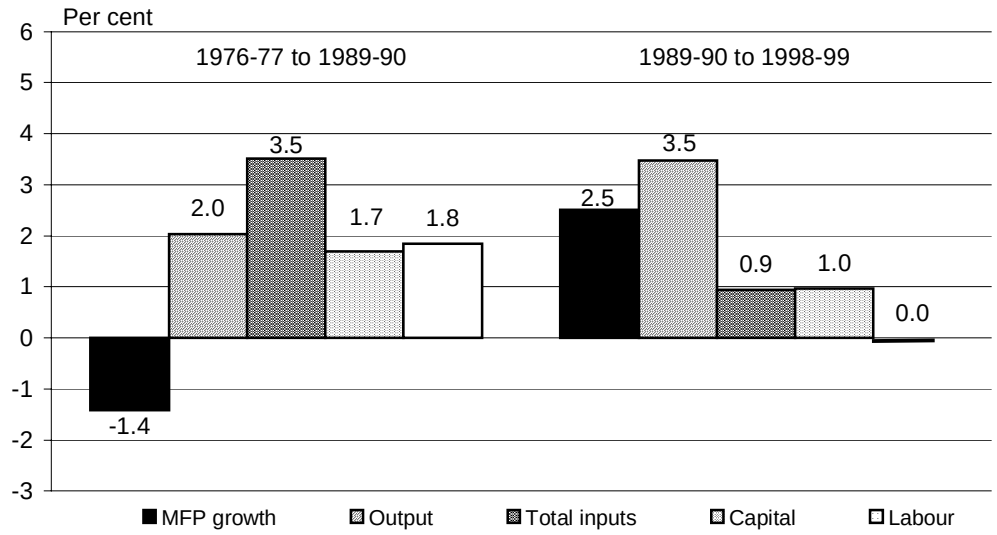
Index 1974-75 = 100



Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

The contributions to wholesale MFP growth for the two periods under consideration are summarised in figure 3.5. Between 1976-77 and 1989-90, the negative MFP growth resulted from input growth that was higher than output growth. Labour and capital input growth contributed equally to the relatively high input growth.[4] The high MFP growth in the 1990s was generated by high output growth sustained by much lower input growth. The lower input growth was contributed by lower labour and capital growth. Capital growth contributed about half the growth in total inputs for 1976-77 to 1989-90 and all of the growth in the 1990s.

Figure 3.5 **Wholesale, contributions to MFP growth, 1976-77 to 1998-99[a]**



a May not add due to rounding. The capital income share of total factor income is based on an average share estimate. For 1976-77 to 1989-90, it was 34 per cent and, for 1989-90 to 1998-99, it was 32 per cent.

Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

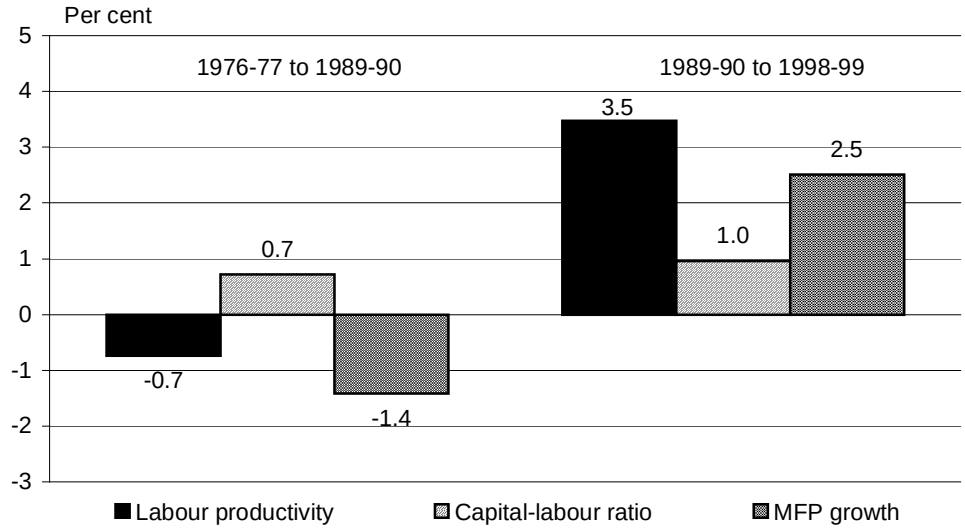
Labour and capital productivity

Actual labour productivity growth between 1976-77 and 1989-90 was -0.7 per cent a year, compared with 3.5 per cent a year between 1989-90 and 1998-99 (table 3.3).

Labour productivity growth is influenced by overall efficiency in factor use and changes in the capital-labour ratio (PC 1999b, p. 27). Figure 3.6 shows that changes in wholesale labour productivity have been heavily influenced by MFP performance. Taking account of the capital share in total factor income, it is estimated that approximately 70 per cent of labour productivity growth in the 1990s was contributed by MFP growth and 30 per cent by capital deepening.

4 The contributions from labour and capital sum to the contribution of total inputs in figure 3.5.

Figure 3.6 **Wholesale, contributions to labour productivity growth, 1976-77 to 1998-99[a]**



a The contributions are estimated by the equation:

$lp = \alpha k + m$

where lp is labour productivity growth, α is the capital share in total factor income, k is growth in the capital-labour ratio and m is growth in MFP.

May not add due to rounding. The capital income share of total factor income is based on an average share estimate. For 1976-77 to 1989-90, it was 34 per cent and, for 1989-90 to 1998-99, it was 32 per cent.

Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Table 3.3 also shows that capital productivity improved between 1989-90 and 1998-99. Before 1989-90, capital productivity growth was strongly negative with actual growth of -2.8 per cent a year. In the 1990s, it turned positive (0.5 per cent a year) because of the strong turnaround in MFP growth which offset higher growth in the capital-labour ratio.

3.4 Retail trade productivity growth

Figure 3.7 shows significant fluctuations in MFP in the retail sector since 1973-74, with positive growth in the first half of the 1980s and the late 1990s.

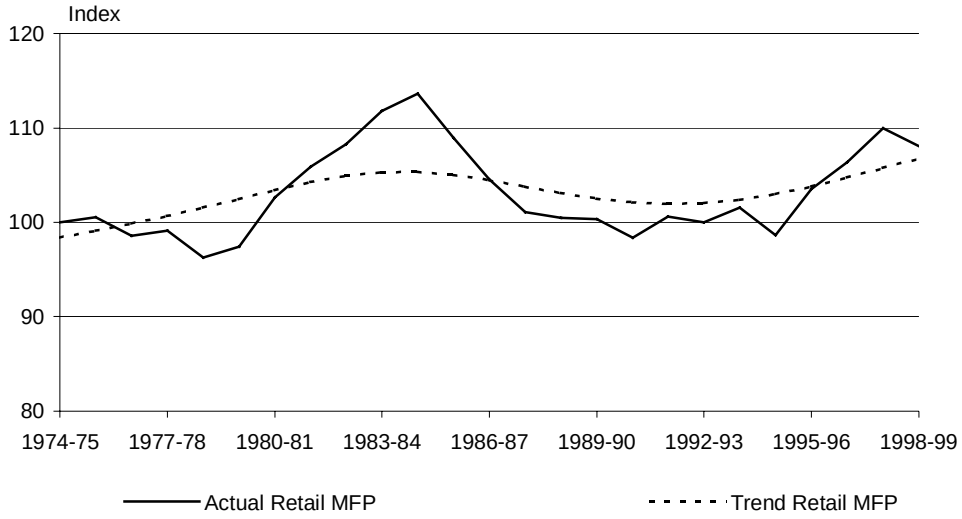
The trend growth shown in figure 3.7 and table 3.4 suggests three distinct phases of productivity growth:

- slowly increasing productivity growth between 1974-75 and 1984-85;
- slowly declining growth between 1984-85 and 1991-92; and
- a return to positive growth since 1991-92.

Actual growth rates for these periods were 1.3, -1.7 and 1.0 per cent a year respectively.

Figure 3.7 **Actual and trend retail multifactor productivity,1974-75 to 1998-99[a]**

Index 1974-75 = 100 for actual MFP



a The trend estimates are based on a Hodrick-Prescott filter (gamma = 100).

Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Output growth and input usage

Changes in both output and input growth have influenced MFP performance in the retail sector.

Figure 3.8 shows that periods of positive MFP growth were also the periods of strongest output growth. Input growth has been strong since the mid-1980s.

Table 3.4 shows that declining MFP between 1984-85 and 1991-92 was caused by input growth exceeding output growth. This arose from a slowdown in output growth and a large increase in input growth.

The recovery of MFP growth between 1991-92 and 1998-99 was closely associated with historically high output growth of nearly 4 per cent a year. Input growth during this period remained strong and was only slightly below that of the previous period.

Table 3.4 Output and input influences on retail multifactor productivity growth, 1974-75 to 1998-99[a]

Annual average growth rates, per cent a year

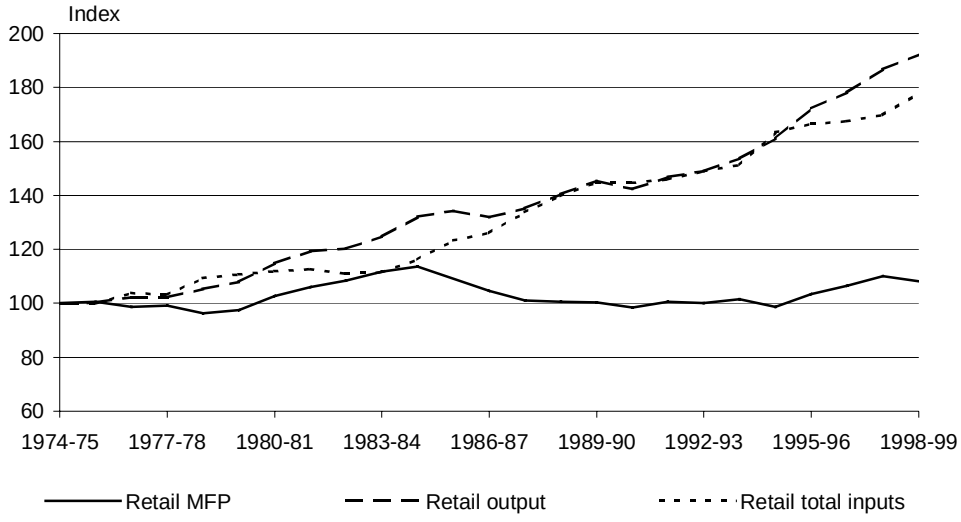
	1974-75 to 1984-85	*1984-85 to 1991-92*	*1991-92 to 1998-99*	*1974-75 to 1984-85*	*1984-85 to 1991-92*	*1991-92 to 1998-99*
	Trend	*Trend*	*Trend*	*Actual*	*Actual*	*Actual*
Output	2.7	2.4	3.3	2.8	1.5	3.9
Total inputs	2.0	2.9	2.6	1.5	3.3	2.9
Labour	1.2	1.9	1.5	0.6	2.4	1.7
Capital	5.9	6.7	6.5	5.6	6.5	7.6
Capital-labour ratio	4.6	4.7	5.2	4.9	4.0	5.8
Labour productivity	1.5	0.5	1.8	2.2	-0.9	2.2
Capital productivity	-2.7	-3.8	-3.8	-2.6	-4.7	-3.5
Multifactor productivity	0.7	-0.5	0.7	1.3	-1.7	1.0

a The trend data were estimated using a Hodrick-Prescott filter (gamma = 100).

Sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

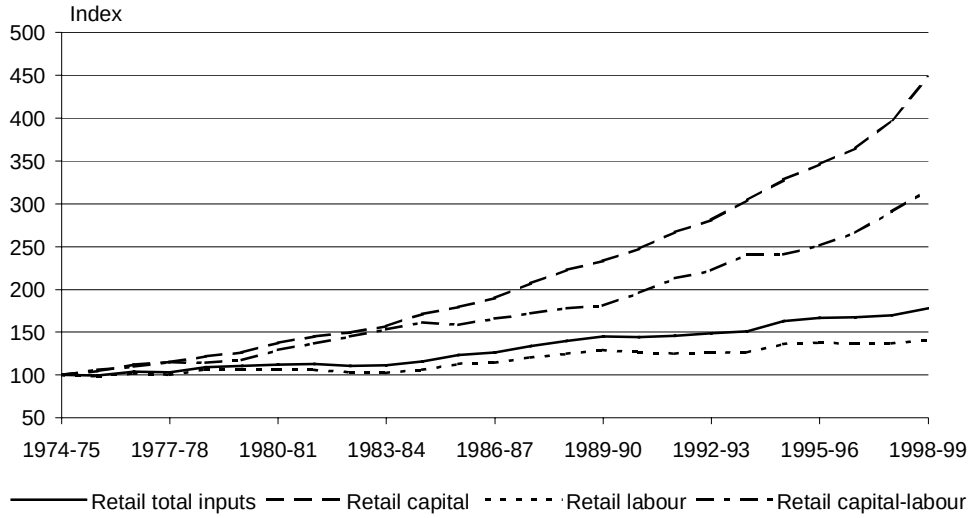
Figure 3.8 Inputs and outputs, retail, 1974-75 to 1998-99

Index 1974-75 = 100



Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Figure 3.9 **Inputs, retail, 1974-75 to 1998-99**
Index 1974-75 = 100



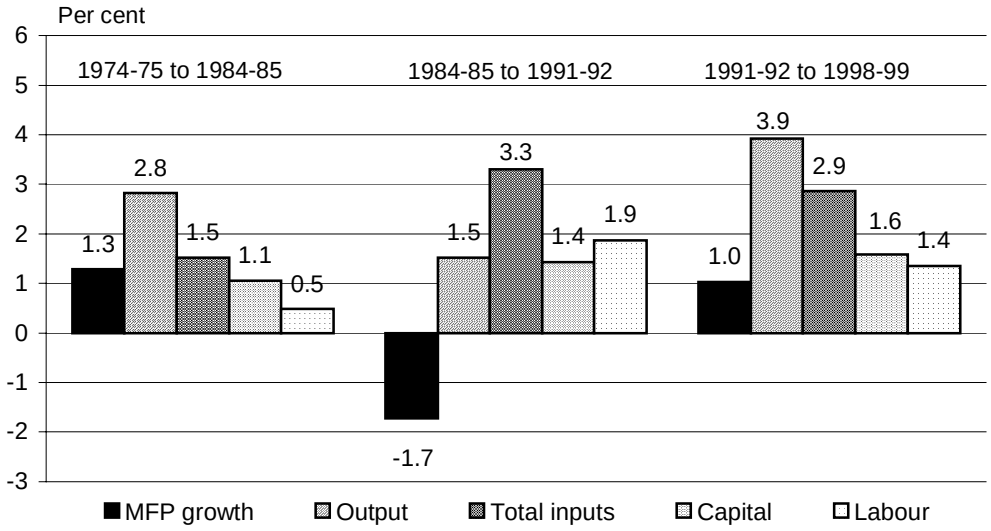
Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Changes in labour growth exerted the major influence on the pattern of input growth, reflecting the highly labour intensive nature of the retail sector. Figure 3.9 shows that the small changes in labour growth were reflected in similar changes in input growth between 1974-75 and 1998-99. Capital input growth was very strong over the whole period.

Table 3.4 shows that the increase in actual input growth between 1984-85 and 1991-92 reflected a significant increase in labour growth and a smaller increase in capital input growth. The slight decrease in input growth in the 1990s was due to reduced labour growth as actual capital growth increased in this period.

The relative contributions to MFP growth are summarised in figure 3.10. Lower output growth and higher input growth led to declining MFP between 1984-85 and 1991-92. During this period, labour growth contributed nearly 60 per cent of total input growth, nearly double that of the previous period. The positive MFP growth in the 1990s was the result of increased output growth sustained by slightly lower input growth. The contribution of labour growth to total input growth fell in this period, contributing less than 50 per cent of input growth, while that of capital growth increased.

Figure 3.10 **Retail, contributions to MFP growth, 1974-75 to 1998-99[a]**



a May not add due to rounding. The capital income share of total factor income is based on an average share estimate. For 1974-75 to 1984-85 it was 19 per cent, for 1984-85 to 1991-92 it was 22 per cent and for 1991-92 to 1998-99 it was 21 per cent.

Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

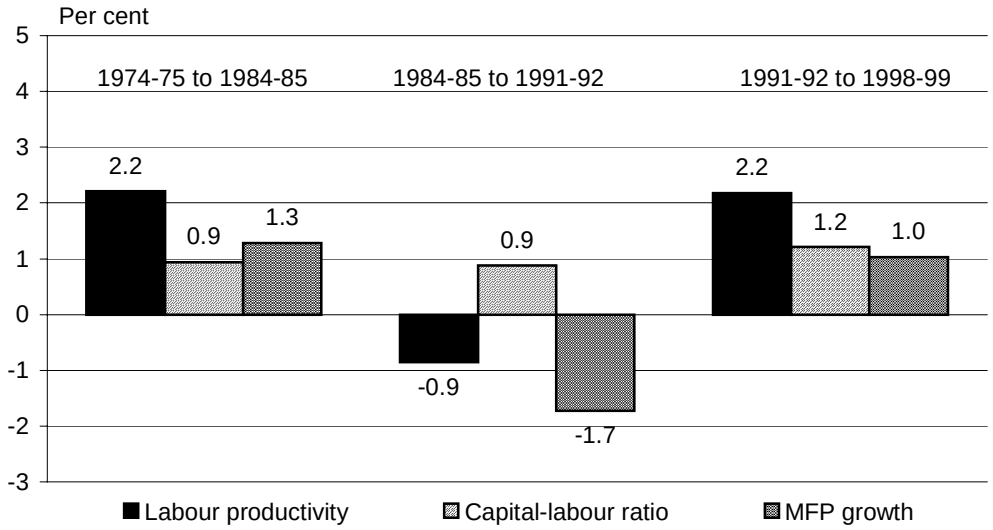
Labour and capital productivity

Table 3.4 shows that actual labour productivity declined (-0.9 per cent a year) between 1984-85 and 1991-92 but recovered in the 1990s (2.2 per cent a year).

Figure 3.11 shows that changes in MFP growth almost wholly accounted for changes in retail labour productivity growth. The decline in labour productivity growth in the 1980s was due to the decline in MFP growth as the contribution of the capital-labour ratio remained the same as in the previous period. The recovery in labour productivity growth in the 1990s was also due to the improvement in MFP. Capital deepening contributed over 50 per cent of labour productivity growth in the 1990s.

Table 3.4 shows that capital productivity declined in each period. The improvement in MFP growth in the 1990s was not sufficient to offset the impact of continuing capital deepening and capital productivity growth remained strongly negative.

Figure 3.11 **Retail, contributions to labour productivity growth, 1974-75 to 1998-99[a]**



a May not add due to rounding. The capital income share of total factor income is based on an average share estimate. For 1974-75 to 1984-85 it was 19 per cent, for 1984-85 to 19991-92 it was 22 per cent and for 1991-92 to 1998-99 it was 21 per cent.

Data sources: Estimates based on unpublished ABS data; Gretton and Fisher (1997).

Summary

MFP growth in the wholesale and retail sectors declined in the 1980s and recovered in the 1990s. However, the recovery was much stronger in wholesale trade. In both cases, the decline in MFP occurred because total input growth outstripped output growth. Capital and labour growth contributed equally to input growth in wholesale trade while, in retail trade, labour growth contributed nearly 60 per cent of total input growth. Wholesale trade is more capital intensive than retail trade.

The recovery in MFP in the 1990s in both sectors was associated with strong output growth. In the wholesale sector, this increase was sustained while there were large reductions in capital and labour growth — in particular, hours worked did not increase at all over the period. In contrast, there was only a small reduction in input growth in the retail sector. Here, labour growth declined but capital growth increased over the period.

Labour productivity increased in both sectors in the 1990s but growth was higher in wholesale trade. Overall improvements in efficiency were the main cause of the higher growth in both cases. In wholesale trade, efficiency improvement contributed some 70 per cent of labour productivity growth while capital deepening provided the main contribution to labour productivity growth in the retail sector.

Capital productivity declined in both sectors in the 1980s. It continued to decline in the retail sector in the 1990s but turned positive for wholesale trade.

4 Wholesale

As noted in chapter 3, from 1976-77 to 1989-90, the wholesale sector had negative annual MFP growth (-1.4 per cent) associated with modest growth in output and labour and strong capital growth. During the 1990s, annual MFP growth (2.5 per cent) improved with stronger growth in output, lower capital growth and significantly reduced labour input growth. Further comparison of the two periods reveals that:

- labour productivity growth improved (-0.7 to 3.5 per cent a year);
- capital productivity growth improved (-2.8 to 0.5 per cent a year); and
- growth in the capital-labour ratio increased (2.1 to 3.0 per cent a year).

There is a paucity of qualitative analysis of the Australian wholesale sector. Thus, the broad outcomes described above leave important questions unanswered. What factors have driven the turnaround in the sector's productivity performance? And, has there been a more or less uniform shift in the performance of all wholesale industries, or do the outcomes reflect the performance of a few industries?

To shed some light on these questions, this chapter identifies wholesale industries which were chiefly responsible for the sector's productivity growth in the 1990s. A program of industry consultations was also undertaken to facilitate the identification of various influences and to gauge the plausibility of productivity trends as estimated from ABS data (see appendix D).

The chapter presents disaggregated industry data to provide a platform for the ensuing discussion of developments across the wholesale trade sector. However, the reliability of industry data declines at lower levels of disaggregation (box 4.1).

Box 4.1 **Data limitations**

MFP estimates are not available at the disaggregated industry level because of the absence of capital services data. Detailed analysis of the main areas of productivity growth for particular industries therefore must rely on labour productivity estimates.

There are differences between the estimates of wholesale output, labour and productivity growth used in this chapter and in chapter 3. The data used in chapter 3 are the most reliable for the wholesale sector as they are based on national accounts data which reconcile production, income and expenditure estimates. The disaggregated production data used in this chapter (and in chapter 5) do not sum to the same sector aggregates (see appendix A). Thus, while the data in this chapter are useful for identifying comparative trends across industries within the sector, they are not used to identify sector-wide trends.

For output, ABS data were only available at the 2-digit sub-division level from 1984-85, although some output data for Computers (4-digit industry) were available from 1994. Faced with these limitations, sales data were used as an indicator of industry activity at a lower level (3-digit) of disaggregation. This seems reasonable given that the ABS has assumed a constant value added to sales ratio since 1991-92.

Labour input data were available at the 3-digit level from 1984-85 and capital expenditure (investment) data were available at the 2-digit level, although some 3-digit data were obtained.

The industry data reported in this chapter are presented as actual, rather than trend, growth rates. This is mainly because the beginning and end periods under review do not appear to be aberrations from longer term trends (that is, unusually high or low points) which would skew the results.

4.1 Industry trends

As a starting point, it is important to have an appreciation of the composition of the wholesale sector. The data in table 4.1 are based on the latest wholesale industry survey for 1991-92. It indicates that the 3 wholesale subdivisions — Basic materials, Machinery and motor vehicle and Personal and Household goods — were roughly of similar magnitude in terms of their contribution to wholesale sector output (gross product).

Table 4.1 **Wholesale trade 1991-92**

Description	*Employed*	*Industry gross product*	*Proportion of IGP* [a]	*Proportion of employment*
	no.	$m	%	%
Wholesale trade	**350 401**	**16 651**	**100.0**	**100.0**
Basic materials	**94 731**	**5 323**	**32.0**	**27.0**
Farm produce	*19 565*	*1 301*	*7.8*	*5.6*
Wool	2 492	521	3.1	0.7
Cereal grain	1 916	210	1.3	0.5
Farm produce and supplies nec	15 157	570	3.4	4.3
Mineral, metal and chemical	*31 012*	*2 352*	*14.1*	*8.9*
Petroleum product	18 686	1 602	9.6	5.3
Metal and mineral	7 669	406	2.4	2.2
Chemical	4 657	344	2.1	1.3
Builders supplies	*44 155*	*1 671*	*10.0*	*12.6*
Timber	6 298	270	1.6	1.8
Building supplies nec	37 857	1 401	8.4	10.8
Machinery and motor vehicle	**144 827**	**6 252**	**37.5**	**41.3**
Machinery and equipment	*102 677*	*4 482*	*26.9*	*29.3*
Farm and construction machinery	16 107	622	3.7	4.6
Professional equipment	8 437	431	2.6	2.4
Computer	22 619	1 110	6.7	6.5
Business machine nec	10 840	390	2.3	3.1
Electrical and electronic equipment nec	19 151	860	5.2	5.5
Machinery and equipment nec	25 524	1 068	6.4	7.3
Motor vehicle	*42 149*	*1 771*	*10.6*	*12.0*
Car	9 358	509	3.1	2.7
Commercial vehicle	6 768	307	1.8	1.9
Motor vehicle new part dealing	21 376	816	4.9	6.1
Motor vehicle dismantling and used part dealing	4 647	138	0.8	1.3
Personal and household good	**110 843**	**5 076**	**30.5**	**31.6**
Food, drink and tobacco	*43 466*	*1 761*	*10.6*	*12.4*
Meat	4 297	164	1.0	1.2
Poultry and smallgood	1 409	37	0.2	0.4
Dairy produce	1 895	70	0.4	0.5
Fish	3 531	118	0.7	1.0
Fruit and vegetable	8 789	355	2.1	2.5
Confectionary and soft drink	2 470	89	0.5	0.7
Liquor	2 265	109	0.7	0.6
Tobacco product and grocery nec	18 810	820	4.9	5.4

(Continued on next page)

Table 4.1 **(Continued)**

Description	*Employed*	*Industry gross product*	*Proportion of IGP* [a]	*Proportion of employment*
	no.	$m	%	%
Textile, clothing and footwear	*14 875*	*767*	*4.6*	*4.2*
Textile product	6 345	329	2.0	1.8
Clothing	7 500	348	2.1	2.1
Footwear	1 031	90	0.5	0.3
Household good	*12 977*	*669*	*4.0*	*3.7*
Household appliance	5 088	352	2.1	1.5
Furniture	2 749	102	0.6	0.8
Floor covering	1 358	62	0.4	0.4
Household good nec	3 782	154	1.0	1.1
Other wholesaling	*39 524*	*1 877*	*11.3*	*11.3*
Photographic equipment	1 808	88	0.5	0.5
Jewellery and watch	2 524	93	0.6	0.7
Toy and sporting good	3 891	192	1.2	1.1
Book and magazines	5 853	252	1.5	1.7
Paper product	9 028	416	2.5	2.6
Pharmaceutical and toiletry	10 095	534	3.2	2.9
Wholesaling nec	6 326	302	1.8	1.8

[a] Industry gross product.

Source: ABS 8638.0.

Below the subdivision level, table 4.1 also presents the relative contributions made by wholesale groups (for example, Mineral, metal and chemical) and classes (for example, petroleum products). These data help to identify the significant industries in the wholesale sector.

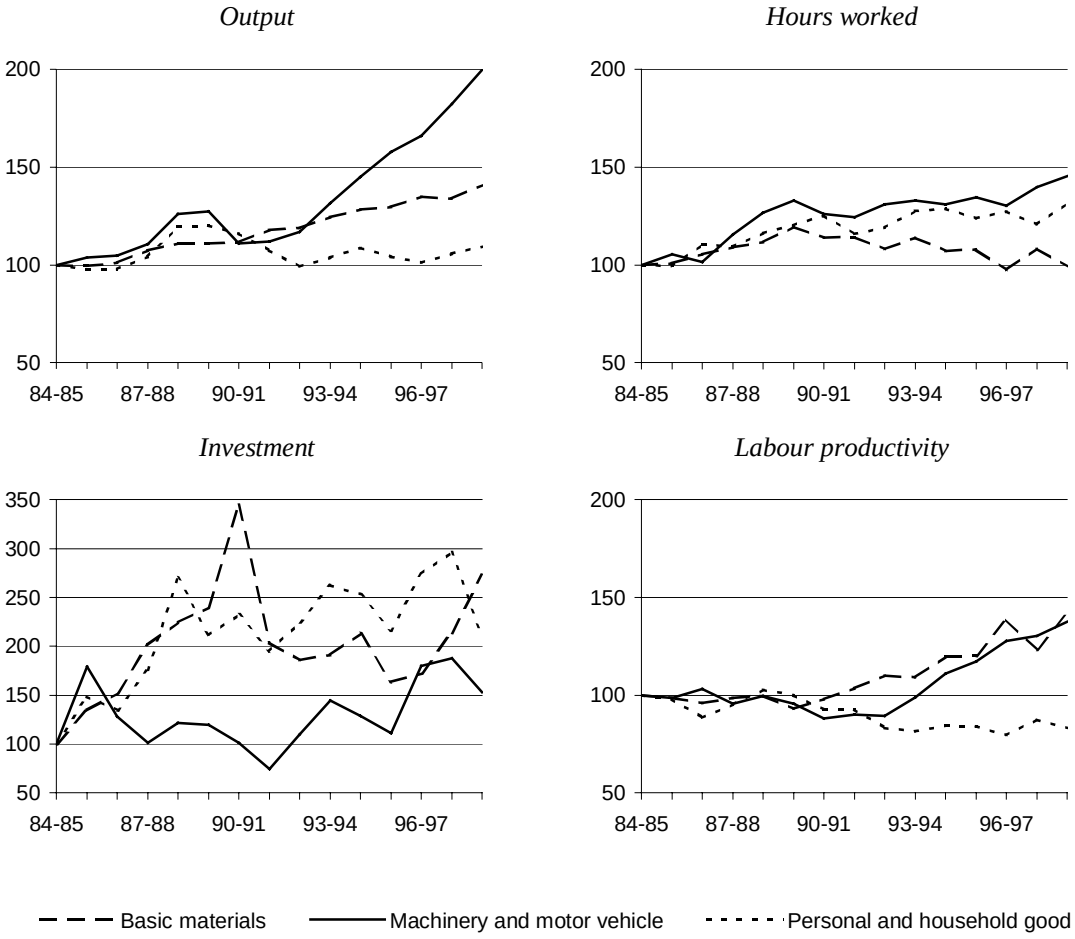
The next section focuses attention on labour productivity estimates to help isolate the key contributors to the turnaround in the wholesale sector's productivity performance in the 1990s.

Subdivision trends

Broad impressions about trends within wholesale industry subdivisions can be drawn from figure 4.1. Perhaps the most striking feature is the poor labour productivity performance of the wholesale subdivisions in the 1980s.

Figure 4.1 **Wholesale output, hours worked, investment and productivity, 1984-85 to 1998-99**

Index 1984-85 = 100



Data source: Based on unpublished ABS data.

In terms of trends in the 1990s, figure 4.1 shows:

- the strongest acceleration in output was in Machinery and motor vehicles which, from the mid-1990s, far outstripped that of other subdivisions;
- there was a decline in hours worked in Basic materials compared to increases in the other subdivisions;
- to the extent that investment data (a poor proxy for capital services) reveal much, they suggest that investment is highly volatile — for example, investment in Personal and household goods grew rapidly in the late 1980s but declined in the late 1990s; and
- a decline in labour productivity in Personal and household goods compared to increases in the other subdivisions.

Closer examination of subdivision growth rates (table 4.2) indicates that between 1989-90 and 1998-99, Machinery and motor vehicle output increased by 5.1 per cent a year. Basic materials output growth also increased (from 2.1 per cent a year for 1984-85 to 1989-90 to 2.7 per cent a year in the following period), while Personal and household goods output declined (from 3.7 per cent a year in the first period to -1.0 per cent a year in the second period).

Table 4.2 **Wholesale growth rates in output, labour input and investment, 1984-85 to 1998-99[a]**

Per cent

Industry	*1984-85 to 1989-90*			*1989-90 to 1998-99*		
	Output	*Hours worked*	*Investment*	*Output*	*Hours worked*	*Investment*
Basic materials	2.1	3.6	19.1	2.7	-2.0	1.4
Machinery and motor vehicle	4.9	5.9	3.6	5.1	1.0	2.8
Personal and household good	3.7	3.8	16.2	-1.0	1.0	-0.1
Total	**3.7**	**4.5**	**12.6**	**2.3**	**0.2**	**1.5**

a Difference between growth rates in this table and those for the wholesale sector in table 3.3 are explained in appendix A.

Source: Estimates based on unpublished ABS data.

The continuing steady growth in Basic materials output during the 1990s was achieved with a decline in labour input of 2.0 per cent a year, in contrast with increasing labour input at 3.6 per cent a year between 1984-85 and 1989-90. Labour growth in Personal and household goods also declined in the 1990s, although this was associated with lower output growth for the period.

These trends in output and labour growth were reflected in significant increases in labour productivity growth in the 1990s in Basic materials and Machinery and motor vehicles, and declining productivity in Personal and household goods (table 4.3). For example, labour productivity growth in Machinery and motor vehicles increased from -0.9 per cent a year in the 1980s to 4.1 per cent a year in the 1990s. For Basic materials, the turnaround was more pronounced.

Table 4.3 **Wholesale labour productivity growth, 1984-85 to 1998-99[a]**
Per cent a year

Industry	*1984-85 to 1989-90*	*1989-90 to 1998-99*
Basic materials	-1.4	4.8
Machinery and motor vehicle	-0.9	4.1
Personal and household good	0.0	-2.0
Total	**-0.8**	**2.1**

a Difference between growth rates in this table and those for the wholesale sector in table 3.3 are explained in appendix A.

Source: Estimates based on unpublished ABS data.

The subdivision data suggest that Machinery and motor vehicles and Basic materials were the main sources of the acceleration in productivity growth in wholesale sector in the 1990s. These can be examined in more detail to better identify the sources of productivity growth (table 4.4). However, as value added data are unavailable at the industry group level, trends in sales were used as an indicator of output (refer box 4.1).

Table 4.4 shows that during the 1990s the annual rate of growth of sales per hour worked was significant in Mineral, metal and chemical (4.0 per cent), Builders supplies (3.7 per cent), Machinery and equipment (2.2 per cent), Motor vehicle (5.4 per cent) and also Textile, clothing and footwear (4.2 per cent). The major contributions to growth in sales per hour worked for the sector as a whole came from Mineral, metal and chemical (42 per cent), Builders supplies (23 per cent), Machinery and equipment (33 per cent) and Motor vehicle (43 per cent).

Taking account of both growth rates and industry contributions, these results suggest that the major sources of the increase in labour productivity in the sector are most likely to have been in Mineral, metal and chemical, Builders supplies, Machinery and equipment and Motor vehicle wholesaling groups.

The 1991-92 Wholesale Survey (table 4.1) indicates that major (4-digit) industry classes, in terms of output, within these industry groups were:

- *Petroleum products*, with 9.6 per cent of wholesale output, had the largest share of any (4-digit) industry;
- *Building supplies*, comprised of Timber (1.6 per cent) and Building supplies nec (8.4 per cent);
- *Computers*, the major component of machinery and equipment wholesaling with 6.7 per cent of total wholesale output; and
- *Motor vehicles*, for which wholesaling of cars and new parts comprised around 10 per cent of total wholesale output.

Table 4.4 **Wholesale sales and labour input by 3-digit industry, 1989-90 to 1998-99**

Per cent

	Sales		*Hours worked*		*Sales/hour worked*	
Industry	*Growth rate*	*Contribution*[a]	*Growth rate*	*Contribution*[a]	*Growth rate*	*Contribution*[a]
	%	%	%	%	%	%
Basic materials						
Farm produce	-4.1	-26	0.7	67	-4.7	-27
Mineral, metal and chemical	1.2	14	-2.7	-311	4.0	42
Builders supplies	0.4	3	-3.2	-644	3.7	23
Machinery and motor vehicle						
Machinery and equipment	3.7	62	1.5	659	2.2	33
Motor vehicle	4.1	36	-1.2	-143	5.4	43
Personal and household good						
Food, drink and tobacco	1.9	19	2.0	374	-0.1	-1
Textile, clothing and footwear	3.4	8	-0.8	-42	4.2	9
Household good	0.6	2	-0.2	-11	0.8	2
Other wholesaling	-1.7	-18	0.8	152	-2.5	-24
Total	1.5	100	0.2	100	1.3	100

a Base year shares are 1989-90.

Source: Estimates based on unpublished ABS data.

These 'self-selected' industry classes were investigated further and form the basis for industry focus studies (see boxes 4.3, 4.5-4.7 and appendix C) to inform the broader 'wholesale productivity story'. Drawing on the data and industry consultations, the remainder of this chapter aims to offer some reasonable explanations for the observed pattern of change in wholesale trade from the 1980s to the 1990s (see table 4.5).

Table 4.5 **Direction of change in wholesale subdivision's growth rate performance from the 1980s to the 1990s**[a]

ANZSIC subdivision	*Output*	*Hours worked*	*Investment*	*Labour productivity*
Basic materials	↑	⇓	⇓	⇑
Machinery and motor vehicle	↑	⇓	↓	⇑
Personal and household good	⇓	⇓	⇓	↓
Wholesale	↓	⇓	⇓	⇑

a Growth rates in the 1990s compared to the 1980s. ↑↓ denotes small positive/negative change; ⇑⇓ denotes larger positive/negative change.

The major determinants of productivity can be classified into three main groups:[1]

- Immediate causes — for example, technology, firm organisation and management practices;
- Underlying factors — for example, competition and demand and supply conditions; and
- Fundamental influences — for example, the policy environment and institutions.

Immediate causes are discussed in the next section which concentrates mainly on the impact of technology — a pervasive facilitator of change — that appears to have been the critical proximate determinant of productivity performance for the sector. It has transformed most facets of distribution, from the shape of warehouses to the culture of management. Underlying factors and fundamental influences are discussed in sections 4.4 and 4.5. Linkages and circularity between these groups of productivity determinants are evident. For example, without a competitive environment, incentives to invest in productivity-enhancing technologies would be weaker.

4.2 Technology and the transformation of wholesaling

Around the 1980s, many wholesale trade activities began changing the way they operated. By the end of the 1990s, the nature of wholesale trade was quite different to that of the past. While there clearly are differences between particular industry sectors, many developments occurred across the board.

There has been an uptake of productivity enhancing technologies in the 1990s and greater penetration of established technologies such as electronic data interchange (EDI). These have greatly altered wholesaling over the last decade. Industry consultations provided a consistent theme that technology has led to increased productivity through its impact on both inter- and intra-organisational relationships. One innovation stands out — the widespread adoption of product numbering and scanning (box 4.2).

New and refined technologies such as radio-frequency scanning of product barcodes have been built around product numbering. As the industry focus boxes presented in this chapter illustrate, these systems, which allow real-time transmission of information and inventory control, have reduced the labour content of distribution. Improvements in accuracy and reduced paper shuffling, handling, storage and errors (and stock returns) have allowed further reductions in labour.

[1] For a full exposition of productivity determinants, see PC (1999b), vol. 1, appendix B.

Consultations with industry representatives and academics indicate that, although some of these technologies had been developed in the mid to late 1980s, they have been widely embraced in the 1990s. For example, warehouse management systems (WMS) which manage all facets of the content of warehouses (for example, the age of stock, use by dates and batching requirements) are a recent innovation. WMS is a component of what is termed Enterprise Resource Planning (ERP). ERP software aims to integrate organisations from (say) marketing to accounts, ordering and finance forecasting. For example, ERP-based systems promote the use of one integrated base for forecasting, rather than each department using a separate approach with different units (that is, dollars, volumes and persons). ERP penetration accelerated in the late 1990s.

Box 4.2 **Barcodes and scanners**

The European Article Numbering (EAN) system is an international system used in many sectors of business. By passing a light beam over a bar code, information can be entered into, and retrieved from, a computer with a low error rate. In Australia, barcoding was initially pressed by grocery retailers and, by the late 1980s, barcodes had been applied to most packaged grocery items. Retailers pushed manufacturers to adopt the system, and as suppliers became barcode compliant, this drove efficiencies further up the supply chain. By 1993, Australia was second behind New Zealand in scanning penetration. Currently, around 87 cents in every grocery dollar is scanned.

As the integral component of many technologies and business systems (for example, radio frequency scanning in warehouses), article numbering has led to a streamlining of the supply chain. For example, 'quick response' — a relatively new industry term — refers to the rapid, accurate and efficient supply of stock. This is possible because of barcodes, scanning and electronic communications, such as EDI, which has achieved greater penetration and application. With this technology, orders are filled faster and accurate data allow minimal stocks to be held. As scanning records transactions exactly, automatic reordering at a predetermined level of stock can be programmed.

Barcoding has heralded the advent of 'paperless' warehouses. Bar code readers automatically count and sort products moving through the facility, and barcoding on outer cartons (for example, including batch numbers, contents and transport manifests) allows for automatic directing and stacking of goods (including their location). Bar codes also describe the contents of mixed pallets.

Barcoding is a means to integrate producers, distributors and retailers with a common language. Industry representatives refer to this as 'seamless integration of the chain'.

Sources: EAN (1998); industry consultations with Australian Retailers Association; Australian Supermarket Institute; EAN Australia; P. Gilmour; P. Dapiran.

New technologies have also improved the efficiency of transportation. Dynamic computer systems can take account of vehicle capacity, traffic flows and congestion patterns. This means that trucks are run on routing systems which plan, in real time, outward and return routes to maximise efficiency in drop-offs and pick-ups and to minimise the time that trucks are empty. This is important for petroleum wholesaling (see box 4.7 and appendix C).

Integration, centralisation and rationalisation

There has been greater integration of the wholesale function. Many businesses now perceive themselves to be operating within 'value networks', rather than as parts of a segmented chain from producer to wholesaler to retailer to consumer (see chapter 2). For example, when a consumer purchases garments from 'Just Jeans', the sale generates a real time re-order at the manufacturing facility (known as a quick response system). Auto-replenishment systems in warehouses similarly can trigger orders when stocks are low.

At some retailers, whitegoods purchases may be arranged with the order going direct to the manufacturer to arrange for delivery to the consumer's home. For the backward integrated wholesaler-retailer, this reduces inventory and storage costs, and eliminates multiple handling.

Where possible, double-handling is being eliminated through centralisation of warehousing and the retirement of satellite, or regional, distribution centres. There has been widespread centralisation of the distribution function by firms such as Philips, Coles Myer and Kodak (industry consultation). For example, during the 1980s, Pioneer Electronics Australia closed all of its regional warehouse operations, except in New South Wales, and handled orders by phone or fax from Melbourne (Gilmour 1993). Centralisation has been aided by improvements in transport which enable goods to be moved overnight from (say) Melbourne to Adelaide, thereby reducing the need for warehouses in source and destination sites. These developments have resulted in further savings from better inventory management.

Centralisation of warehouses was evident in the 1980s and continued through the 1990s. On the other hand, 'cross-docking' — taking goods from their source and 'across the docks' of the distribution centre for transport to their ultimate destination, rather than storing them — has become prevalent in the last decade.

In several industries, there has been a continuing process of mergers, acquisitions and rationalisation. Such developments in the timber and hardware building supplies industries are discussed in box 4.3. The box also canvasses the use of cross-docking, electronic ordering and warehouse centralisation.

Box 4.3 **Industry focus: hardware and timber wholesaling**

Economic growth is a key determinant of output for the timber and building (hence, hardware) industries. Output is particularly sensitive to interest rates. That said, there has been major restructuring in these sectors. Competition, pushed by the big 'category killer' retailers (for example, Bunnings and BBC Hardwarehouse) has encouraged industry rationalisation. Independent hardware wholesalers have merged or been taken over. While this has been going on since the 1960s, the process has been very evident over the last decade. By the late 1990s, there were two principal hardware wholesalers — Mitre 10 and John Danks.

Rationalisation also has occurred in timber wholesaling, although there are more firms in the timber supply chain, reflecting differences in product characteristics and specialisation of timber species and manufacturing processes. There were several acquisitions by CSR in the 1990s, which itself subsequently exited the industry.

Hardware wholesalers have centralised management and distribution operations. For example, Danks' operation in Melbourne covers large areas (for example, it includes Alice Springs). Centralisation has been helped by more efficient, and often overnight, freight services.

There has been a trend toward larger warehouses in hardware and timber wholesaling driven by pressures to increase efficiency and the need to better respond to consumer wants — wholesalers are covering an expanding product range with an emphasis on more value-added products such as timber engineered products (for example, laminated beams). Competition at the retail end has put price pressure on hardware wholesalers, further encouraging closures of smaller warehouses.

Information technology and EDI have strongly affected the productivity performance of wholesalers. Technology has contributed to rationalisation of storage requirements — for example, while stock may be ordered through traditional channels, the physical delivery may be direct to the retailer from the manufacturer, or involve cross-docking at the warehouse. Moreover, there has been an increasing trend in retail stores to automated electronic ordering after sales are scanned. Wholesalers often have direct access to this data.

Material handling equipment has improved, even though hardware and timber wholesaling are still 'fork-lift operations'. B-doubles are often now used for transport and palletisation, with pallets designed to fit fork lifts, trucks and shelving, has become increasingly common. A decade ago wholesalers were using loose boxes. It is now common for wholesalers to contract-out transport, and warehouses are often now located on major transport routes.

Industrial relations changes in the 1990s have promoted greater flexibility in work arrangements and demarcations have been reduced — for example, staff can now work in the yard and the shop. Staff numbers in the sector have fallen.

Sources: Industry consultations with Hardware Association of Victoria; Timber Merchants Association.

Developments in warehousing

In the 1980s, high rise warehouses essentially acted as storage facilities and, with prevailing high interest rates, the costs of holding inventory were high. In the 1990s, the emphasis changed to less reliance on storage and more on flows through these facilities. This trend has continued with distribution increasingly concerned with the rapid flow-through of goods. As Gilmour (1993, p. 128) has observed, the large stacking crane warehouses of the 1980s are in decline:

> In the 1970s and early 1980s a number of high rise storage facilities were built. By the end of the 1980s and early 1990s the emphasis had swung from storage to throughput and many of these systems were either modified or scrapped.

Warehouse operations are becoming more sophisticated with further developments of the 'just in time' (JIT) approach. Systems now can trigger automatic replenishment orders based on stock levels, and outgoing orders may be assembled using 'paperless picking' systems (see box 4.4).

Box 4.4 Paperless picking systems

In essence, paperless pick systems involve orders coming to a warehouse, typically by phone or facsimile. The order and all of the components (for mixed consignments) are allocated bar codes. In highly automated operations the required stock may be pushed onto a conveyer belt. Alternatively, carts guided by barcode readers move around the facility and stop automatically at the required stock item where the 'driver' loads the items. Less automated systems may involve the manual filling of barcoded cartons, from surrounding storage racks, which move past operators on a conveyer belt. The term paperless pick system refers to the replacement of systems in which people moved around warehouses with tick-box paper order forms.

The degree of sophistication and automation depends on the unit values of the goods, their physical dimensions and the product range to be batched. For example, warehouses holding parts for motor vehicles may employ a higher degree of automation for smaller parts than for body panels which usually need to be manually picked. Similarly, when assembling orders of a diverse range of products — (say) beachballs, ladders and books for delivery to a department store — manual picking is required and the labour content is relatively high. In fact, distribution is still a high labour content area.

Sources: Industry consultations with EAN Australia; academics (see appendix D).

One industry where fast flow through of stock is critical is computer hardware. With the rapid depreciation of the value of hardware, holding inventory for too long severely impinges upon a wholesaler's margin — for example, a scanner which cost $800 two years ago would have the same functionality as one costing around $200 today (box 4.5).

Box 4.5 **Industry focus: computer hardware wholesaling**

IBM Australia

IBM is seeking to grow its contracting business and is moving to importing and contract manufacturing for hardware. IBM has actively pursued strategies to slash wholesaling and to minimise the holding of inventory through 'just in time' systems. Cycle times — from production to delivery to end user — have improved markedly. For example, worldwide, IBM reduced inventory carrying costs by $220 million last year and cut delivery costs by $270 million.

Hewlett Packard Australia (HP)

HP has outsourced its distribution to three wholesalers. Prices are falling, but there has been significant output growth. The wholesalers run on tight margins and are using larger warehouses, but not holding more stock per se. HP adopts a 'just in time' approach — 45 days in advance for high volume units, of which about 90 per cent comes from a factory in Singapore. Certain high end systems are delivered straight from the factory to the end-user. HP's wholesalers have established their own 'second tier' sub-distributors to handle some commodity lines, such as inkjets.

Warehouses are becoming more automated to keep stock levels down and labour inputs are declining. Programs such as auto inventory replenishment (AIR) monitor stocks and each wholesalers' past performance in terms of the rate at which it moves goods. These data are collected centrally by HP. HP is aiming for 'straighter lines' in distribution with rapid transactions through the chain and reduced paper flows.

Tech Pacific, one of HPs wholesalers, operates an automated paperless picking system which can accommodate 70 vendors with different requirements. Barcoding has been instrumental for such systems.

Fujitsu

Fujitsu has been centralising warehousing throughout the 1990s and distribution points have been consolidated. The average unit value of goods has fallen, but volumes have increased. Fujitsu's warehouse operation in Sydney has achieved significant productivity gains in recent years in response to increased competition and pressure from management. Staff numbers have been cut from 8 in the 1980s to 4 today, but output has increased. Transport is now contracted out.

Manual recording systems (and manual operators) have been replaced. Scanning systems have been introduced and the new software has improved recording and management of stock. The system allows for detailed analysis of stock, movements and scheduling. For example, it used to take 3-4 weeks to conduct stock-take reports by hand. Now it takes a day. The movement and parcelling of goods in the warehouse has become more automated. Consequently, there are fewer rest breaks.

Sources: Industry consultations with IBM Australia; Fujitsu Australia Ltd; Hewlett-Packard Australia.

Management culture and structures

With improvements in technology, and in particular software applications that are built on the integration of organisations into the distribution network, there have been cultural changes in many organisations. For instance, improved understanding of, and specialisation in, logistics has occurred in many firms.

Better business practices in the distribution sector are, in part, related to technology. For instance, while JIT is not a new concept — in some manufacturing environments, vendors have delivered to live production lines for many years — its implementation is being expedited in wholesale as computer software systems improve the capacity to coordinate the process.

At a management level, appreciation of the distribution logistics is more acute than in the past. Many multinationals based in Australia using ERP and WMS type systems have facilitated their transfer domestically. Moreover, adoption of these strategies has increased with a trend for flatter and more integrated management structures — changes in thinking are bringing about changes in structure.

Academics consulted in this study referred to a trend away from 'silo' structures to flatter management. Those in industry used similar terms — for example, Hyundai noted a change from 'chimney' style management to flatter structures. Silo management was based on a focus on the performance of an individual group, rather than the entity as a whole. For instance, in the past logistics personnel heading up the components of a major chain (for example, supermarkets, clothing and general retail) may each have run their own trucks and warehouses and organised their own purchases. Now these activities are increasingly being centralised in group logistics units.

Outsourcing

It is now common for wholesalers to contract-out the transport of goods to dedicated carriers who can achieve greater economies of scale. For instance, the petroleum distribution sector has moved to 'get out of capital' by outsourcing the transport of fuel to dedicated hauling companies (box 4.7). Fujitsu also has benefited from outsourcing the transport of goods.

Where warehouse operations are outsourced to third parties the activity remains, for statistical purposes, within the wholesale sector. In instances where transportation is outsourced, there may be some decline in measured labour and capital in wholesale activities (relative to output) and an increase in the transport and storage sector. However, as the Australian Petroleum Agents and Distributors Association

(APADA) noted, the reductions in labour in petroleum distribution are unlikely to be fully offset by employment in the transport sector.

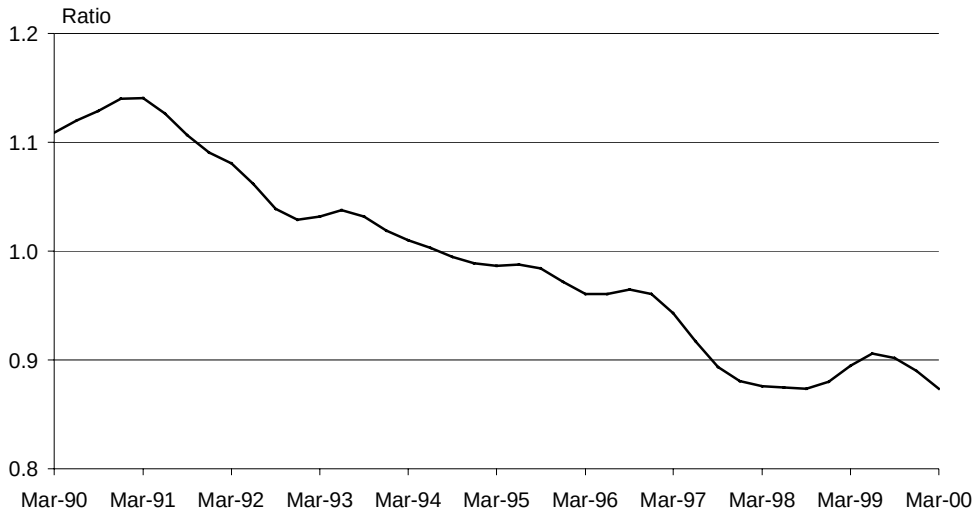
On the other hand, some outsourcing is resulting in more work and increased margins for wholesalers. Hewlett-Packard noted, for example, that it outsources all integration work (that is, value-adding by packaging systems that use HP components — perhaps in tandem with other hardware and/or software) to its wholesalers.

Impacts of the transformation of wholesale trade

One way of assessing the effect of new technology and more productive stock management is to track stocks and sales. In fact, there has been an noticeable decline in the stocks to sales ratio held by private businesses throughout the 1990s (figure 4.2). While stock *levels* may fluctuate with changes in the business cycle, there has been a downward trend in the *ratio*. The ABS (1996, p. 58) noted that:

> One of the possible factors behind the general decrease in the non-farm stocks to sales ratio is the adoption by business of more cost-effective stock management systems.

Figure 4.2 **Private non-farm inventories to total sales ratio, 1990 to 2000[a]**
Trend, current prices, quarterly data

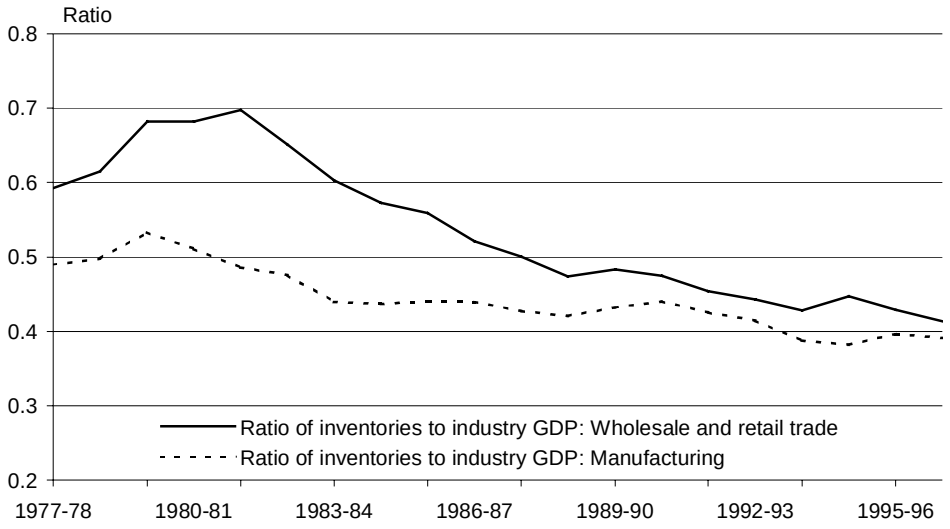


a 'Inventories' is defined as all inventories of materials etc, work in progress and finished goods owned by the business, whether held at locations of the business or elsewhere. 'Sales' is defined as: household final consumption expenditure on goods; plus private gross fixed capital formation: dwellings, other buildings and structures, and machinery and equipment; plus public gross fixed capital formation: dwellings, other buildings and structures, and machinery and equipment; plus exports of goods.

Data sources: ABS Time Series Statistics Plus database on EconData; ABS 5206.0.

This trend is also evident in terms of the inventories to output ratio for the distribution sector (that is, combined wholesale and retail trade) and for manufacturing shown in figure 4.3.[2] This longer series spans the consolidation of warehouses which commenced in the 1980s as well as the wider application of systems aimed at more rapid distribution. However, these data, based on point in time observations, are unlikely to show the full benefits of more rapid distribution flows. On the other hand, some reduction in inventories may have been associated with increased outsourcing of activities such as transport (that is, for example, fewer trucks).

Figure 4.3 **Ratio of inventories to industry GDP for manufacturing and combined wholesale and retail trade, 1977-78 to 1996-97**
Current prices



Data sources: Estimates based on ABS National Accounts database on EconData; ABS 5629.0; RBA (1996).

4.3 Underlying influences on productivity

Technology, firm organisation and management practices, and rationalisation have had a significant impact on productivity in the wholesale sector. Although important, these are not the only forces at work. Indeed, for some sectors, technology may be a secondary influence. There is a range of other underlying productivity determinants such as competition and demand and supply conditions.

[2] The distribution sector as a whole is shown in figure 4.3, rather than disaggregated by wholesale and retail trade, because inventories are based on ownership. As goods which flow through a wholesale facility may be 'owned' by a retailer, it is appropriate to present estimates based upon inventories held in the distribution sector as a whole.

Competition

Competition is one of the most potent forces affecting productivity in the wholesale sector. Irrespective of whether competition derives from domestic firms or from imports, it provides an incentive to implement many of the factors (for example, new technologies and innovation) that promote productivity growth.

The importance of competition for productivity was raised in most of the industry consultations. For example:

- in the petroleum industry, Australian Competition and Consumer Commission 'competition policy undertakings' have provided independent wholesalers with better access to terminal capacity, thereby increasing competition amongst refiners, other fuel distributors and retailers (see appendix C);
- in the car industry, the introduction of the inexpensive Korean 'drive away, no more to pay' car is considered to have placed significant pressure on manufacturers, other importer-distributors and retailers;
- competition in the computer and hardware industries is driving the pursuit of increased efficiency and cost savings throughout the distribution chain; and
- the rationalisation that is occurring in sectors such as hardware, petroleum and motor vehicles — resulting in relatively lower labour requirements and the retirement of less productive capital — is a response to competitive pressures.

In the absence of strong competition, it is unlikely that the technologies, changes in management structures and firm organisation and outsourcing discussed in section 4.3 would have been implemented to the same extent. Lack of competition reduces incentives to implement, or even be aware of, best practice processes.

Demand and output

Productivity is concerned with the relationship between output and inputs used in production (see appendix B). Changes in output affect measured productivity. This may, for example, explain the volatility in farm produce wholesaling which is sensitive to factors such as weather and movements in world prices. Indeed, the APADA noted that when agriculture, and in particular 'power farming', is doing well, demand for diesel fuel increases significantly.

Building and timber supplies wholesaling is sensitive to the prevailing demand for new houses and renovations (box 4.3). Likewise, while motor vehicle wholesaling has benefited from improvements in distribution (and warehouse management

systems for parts), much of the productivity growth in the 1990s can be attributed to a significant increase in the demand for cars (box 4.6 and appendix C).

Box 4.6 **Industry focus: motor vehicle wholesaling**

Improvements in the productivity performance of motor vehicle wholesaling is mainly a result of a surge in output and improvements in the distribution of vehicles and parts.

The growth in output of motor vehicle wholesaling is reflected in the increase in new motor vehicle sales during the 1990s following the economic downturn in 1991-92 (see figure C.3). Improvements made in the distribution of motor vehicles include:

- the introduction of computerised logistics and faster distribution arrangements which has enabled the facilities to handle more vehicles — for example, Inchape Motors has more than trebled the number of vehicles going through the same compound;
- a shift from the fitting of badges and certain accessories by the distributor/wholesaler of imported vehicles back to the production line; and
- improvements in the packaging material used to protect imported vehicles during shipping which requires less detailing of the vehicle by the distributor/wholesaler.

Productivity has also been affected by changes in workplace arrangements brought about by enterprise bargaining which has increased flexibility through:

- allowing shift arrangements to better match shipping and delivery times and facilitating the introduction of split shifts in some areas of operations; and
- enabling capital equipment to be used more intensively and increasing throughput.

For new car parts, there is a need to maintain large inventories for commercial and legislative reasons. However, there have been increased efficiencies in distribution from:

- the use of centralised parts distribution centres rather than satellite centres;
- computerised stock control;
- automated picking systems; and
- better transport arrangements (for example, overnight freight).

Moreover, industry representatives consider that there is scope for further significant productivity gains in motor vehicle wholesaling.

Sources: Industry consultations with Inchape Motors Australia; Hyundai Automotive Distributors Australia; Motor Trades Association of Australia.

4.4 Fundamental influences on productivity

Government policies and institutions can have a major impact on the wholesale sector. For example, given the extent to which transportation is being outsourced, government policies affecting transport infrastructure and the regulation of transport are likely to be important for the distributive trades.

Changes in labour market institutional arrangements, such as an increasing emphasis on enterprise agreements, were raised in industry discussions, although more often in the retail sector than in wholesale (see chapter 5). Nonetheless, increased flexibility in hours worked, movements to split shifts, better matching of work hours to receipt and delivery times, and reductions in demarcation were linked to enterprise bargaining in wholesale activities. Most industry representatives considered that these changes had been assisted by reforms to industrial relations legislation which has increased the focus on enterprise-based, rather than industry-based, work conditions.

The performance of the petroleum wholesaling industry illustrates how many immediate, underlying and fundamental factors can jointly influence productivity performance. Box 4.7 (and appendix C) present a synthesis of the key influences for that industry.

4.5 Conclusion

Deriving productivity estimates is a quantitative exercise. Assessing the veracity of the estimates requires additional qualitative analysis. To this end, important wholesaling industries were ‘sampled’ and overall impressions were sought from industry specialists in logistics.

A key message emerging from the industry consultations is that the performance of the wholesale trade sector in the 1990s is, in terms of the extent and timing of changes, broadly consistent with the observed productivity surge for the sector identified in the statistical analysis.

This assessment relies upon sampling key 4-digit classes which make up a large share of those 3-digit industry groups identified as major contributors to wholesale sector productivity. Despite the significant coverage of these groups, in terms of the share of wholesale output of the sampled industry classes, it is conceivable that the performance of the latter may not be fully indicative of the overall performance of their respective group. However, industry consultations generally have supported the trends identified in the data as they relate to particular subdivisions.

Box 4.7 **Industry focus: petroleum wholesaling**

At the refinery-wholesaler level, factors leading to improved productivity include:

- Firm exits and mergers which have led to a rationalisation of the ownership of capital and the retirement of less productive assets. This has increased capacity to take advantage of economies of scale and encouraged improved firm organisation and management practices;
- Greater competition from independent wholesalers, expedited by Australian Competition and Consumer Commission 'competition policy undertakings' which provided independent wholesalers with much improved access to terminal capacity and therefore the Australian market;
- General economic conditions which has seen output, especially for diesel fuel, rise in the 1990s as a result of buoyant economic conditions; and
- Workplace reforms, including greater use of enterprise bargaining agreements, which have led to improved flexibility and efficiency.

In terms of petroleum distribution, the key factors affecting productivity appear to be:

- Rationalisation and integration reflected in the number of distributors falling from around 1700 in the early 1980s to less than 400 today. The number of distribution staff has fallen and has not been offset by the increased use of contractors;
- Avoidance of double-handling with more fuel deliveries bypassing regional depots;
- Outsourcing to contract hauling companies, using B-doubles, direct from the coast to large customers, rather than offloading into a depot. This reflects a general trend for distributors to 'get out of capital';
- A move by distributors to take more margin in the chain by owning petrol stations;
- More flexible work arrangements which allow more intensive use of capital. For example, instead of down time on a truck driver's rest day, the truck can be used by the distributor to make deliveries;
- Changes in government policies. For example, there were requirements that a percentage of volume had to be moved by rail. This requirement has been reduced in the last decade which has cut distribution costs by avoiding double handling; and
- The quality of operators (that is, business acumen) has improved as they have become larger.

Source: Industry consultations with Australian Institute of Petroleum; Australian Petroleum Agents and Distributors Association; Motor Trades Association of Australia.

For the *Basic materials* subdivision, it is important to note that throughout the 1990s, farm produce (such as wool and grains) was the largest 'detractor' in terms of declining sales for 3-digit groups (table 4.4). This was in the face of modest growth in labour. Moreover, Farm produce made up about 25 per cent of the output of Basic materials in 1991-92. This relatively stagnant output was not reflected in other industries within the subdivision.

The Timber and Building supplies (box 4.3) and Petroleum products industries (box 4.7) revealed similar stories — both industry classes experienced significant rationalisation in the 1990s coupled with the introduction of new technologies, and both registered strong reductions in labour inputs (table 4.4). Developments in each of these industries is consistent with the observed strong labour productivity improvement.

In terms of the *Machinery and motor vehicle* subdivision, analysis of new car wholesaling indicates that the dominant influence in the (latter) 1990s has been a surge in output strongly linked to the increase in car affordability (box 4.6). For the New parts industries, the ageing of the Australian motor fleet and the tendency for smash repairers to now replace body panels has played a role in boosting output (discussed further in chapter 5). However, in the case of New parts, technology has been important in streamlining warehouse and distribution arrangements. Industry consultations confirmed that the increased output was accommodated with either little growth or reductions in labour inputs.

Similarly, increasing demand for computer hardware has impacted positively on the computer hardware industries (box 4.5). And, not surprisingly, this sector appears to have been at the forefront of implementing new technologies to improve warehousing. This has contributed to significant reductions in the amount of labour required relative to sales. Thus, for the Machinery and motor vehicle subdivision, it appears that increased output in the 1990s was accompanied by a rationalisation of labour inputs.

The academics consulted — who have a broad over-arching knowledge of the sector as a whole and practical experience with particular wholesale industries — confirmed a dramatic uptake of new productivity enhancing technologies in the 1990s. These trends are supported by the firms visited. Across the wholesale sector, it is reasonable to take the view that in the 1990s:

- the concept of warehousing to hold inventory has declined;
- new 'just in time' systems such as automatic inventory replacement systems were widely implemented;

- minimisation of double handling through cross-docking and centralisation of distribution, leading to the retirement of less productive capital, accelerated;
- developments such as paperless picking systems followed the widespread penetration of barcoding and real time radio frequency inventory control;
- outsourcing of many aspects of distribution and transport in particular accompanied many of these developments; and
- labour intensities declined in many facets of wholesaling.

The wholesale sector is now typified by larger and more centralised warehouse facilities geared to distribution rather than storage. The sector essentially has embarked upon a process of 'asset transformation' involving the replacement of hard assets like inventory, trucks and numerous warehouses with information systems.

These developments would have been difficult to achieve, perhaps infeasible, without the significant gains afforded through technology — that is, barcoding, scanning and the associated systems which rely on data interchange. The data on stocks to sales ratios support a significant positive impact from the adoption of new technologies in the wholesale sector.

In sum, the broad/general robustness of the productivity estimates is supported by the congruence of experiences across a diverse range of industries. Indeed, the major (proximate) determinants of productivity growth were consistently identified as important features of performance.

5 Retail

As noted in chapter 3, the retail sector has experienced three phases of productivity growth since the mid 1970s (table 3.4). From 1974-75 to 1984-85, MFP increased by 1.3 per cent per year, before falling to -1.7 per cent per year between 1984-85 to 1991-92. Subsequently, it recommenced on a moderate growth path of 1.0 per cent per year. These phases of increasing, decreasing and increasing MFP growth are reflected in changes in the pattern of inputs and output growth. The improvement in the 1990s — which was substantially less than the turnaround in wholesale productivity growth — appears to be the result of reduced labour input growth.

In this chapter, retail sector trends are examined in more detail to identify the industries mainly responsible for the turnaround from the 1980s to the 1990s. Industry consultations were undertaken (appendix D) to facilitate this examination.

Analysis of retail sector trends at the 3-digit group level relies on labour productivity estimates. The same general qualifications apply to this analysis as were outlined in chapter 4 and in more detail in appendix A. However, unlike wholesale trade, estimates of retail output and labour productivity (rather than sales per hour worked) are available at this level of disaggregation. Unfortunately, the data are available only from 1984-85. Thus, it was not possible to construct estimates at the group level for all three phases of productivity growth.

5.1 Industry trends

As a starting point, it is necessary to understand the composition of the retail sector. Output shares (industry gross product) data in table 5.1 are based on the latest available retail industry census — for 1991-92. The table indicates retail subdivisions (for example, Total food), groups (for example, Total specialised food) and classes (for example, Fruit and vegetable).

The following section seeks to determine whether trends in output growth and input use have been uniform, or whether some industries explain more of the retail MFP story than others.

Table 5.1 **Retail trade 1991-92**

Description	*Number employed*	*Industry gross product*	*Proportion of IGP*[a]	*Proportion of employment*
	no.	$m	%	%
Retail trade	**831 253**	**18 095**	**100.0**	**100.0**
Food	**327 223**	**5 737**	**31.7**	**39.4**
Supermarkets and grocery stores	*172 482*	*3 283*	*18.1*	*20.7*
Specialised food	*154 741*	*2 463*	*13.6*	*18.6*
Fresh meat, fish and poultry	19 642	460	2.5	2.4
Fruit and vegetable	10 283	223	1.2	1.2
Liquor	7 431	220	1.2	0.9
Bread and cake	15 620	295	1.6	1.9
Takeaway food	91 398	1 068	5.9	11.0
Specialised food nec	10 367	197	1.1	1.2
Personal and household good	**337 588**	**7 604**	**42.0**	**40.6**
Department stores	*93 538*	*1 930*	*10.7*	*11.3*
Clothing and soft good	*75 684*	*1 498*	*8.3*	*9.1*
Clothing	53 196	1 076	5.9	6.4
Footwear	11 796	210	1.2	1.4
Fabrics and other soft good	10 692	212	1.2	1.3
Furniture, houseware and appliance	*51 513*	*1 368*	*7.6*	*6.2*
Furniture	8 929	249	1.4	1.1
Floor covering	4 168	130	0.7	0.5
Domestic hardware and houseware	18 908	413	2.3	2.3
Domestic appliance	17 378	529	2.9	2.1
Recorded music	2 131	47	0.3	0.3
Recreational good	*40 033*	*905*	*5.0*	*4.8*
Sport and camping equipment	7 615	189	1.0	0.9
Toy and game	2 186	46	0.3	0.3
Newspaper, book and stationary	26 644	575	3.2	3.2
Photographic equipment	1 695	44	0.2	0.2
Marine equipment	1 894	51	0.3	0.2
Other personal and household good	*71 666*	*1 775*	*9.8*	*8.6*
Pharmaceutical, cosmetic and toiletry	35 325	933	5.2	4.2
Antique and used good	3 293	74	0.4	0.4
Garden supplies	3 987	94	0.5	0.5
Flower	4 149	66	0.4	0.5
Watch and jewellery	12 360	334	1.8	1.5
Retailing nec	12 552	274	1.5	1.5

(Continued on next page)

Table 5.1 **(Continued)**

Description	*Number employed*	*Industry gross product*	*Proportion of IGP*[a]	*Proportion of employment*
	no.	$m	%	%
Household equipment repair services	*5 154*	*128*	*0.7*	*0.6*
Motor vehicle retailing and services	**166 443**	**4 744**	**26.2**	**20.0**
Motor vehicle retailing	*52 371*	*1 837*	*10.2*	*6.3*
Car	48 488	1 713	9.5	5.8
Motor cycle dealing	3 058	100	0.6	0.4
Trailer and caravan dealing	824	24	0.1	0.1
Motor vehicle services	*114 072*	*2 907*	*16.1*	*13.7*
Automotive fuel	42 054	957	5.3	5.1
Automotive electrical services	5 899	158	0.9	0.7
Smash repairing	27 434	783	4.3	3.3
Tyre	9 486	267	1.5	1.1
Automotive repair and services nec	29 199	742	4.1	3.5

[a] Industry gross product.

Source: ABS 8625.0.

Industry group trends

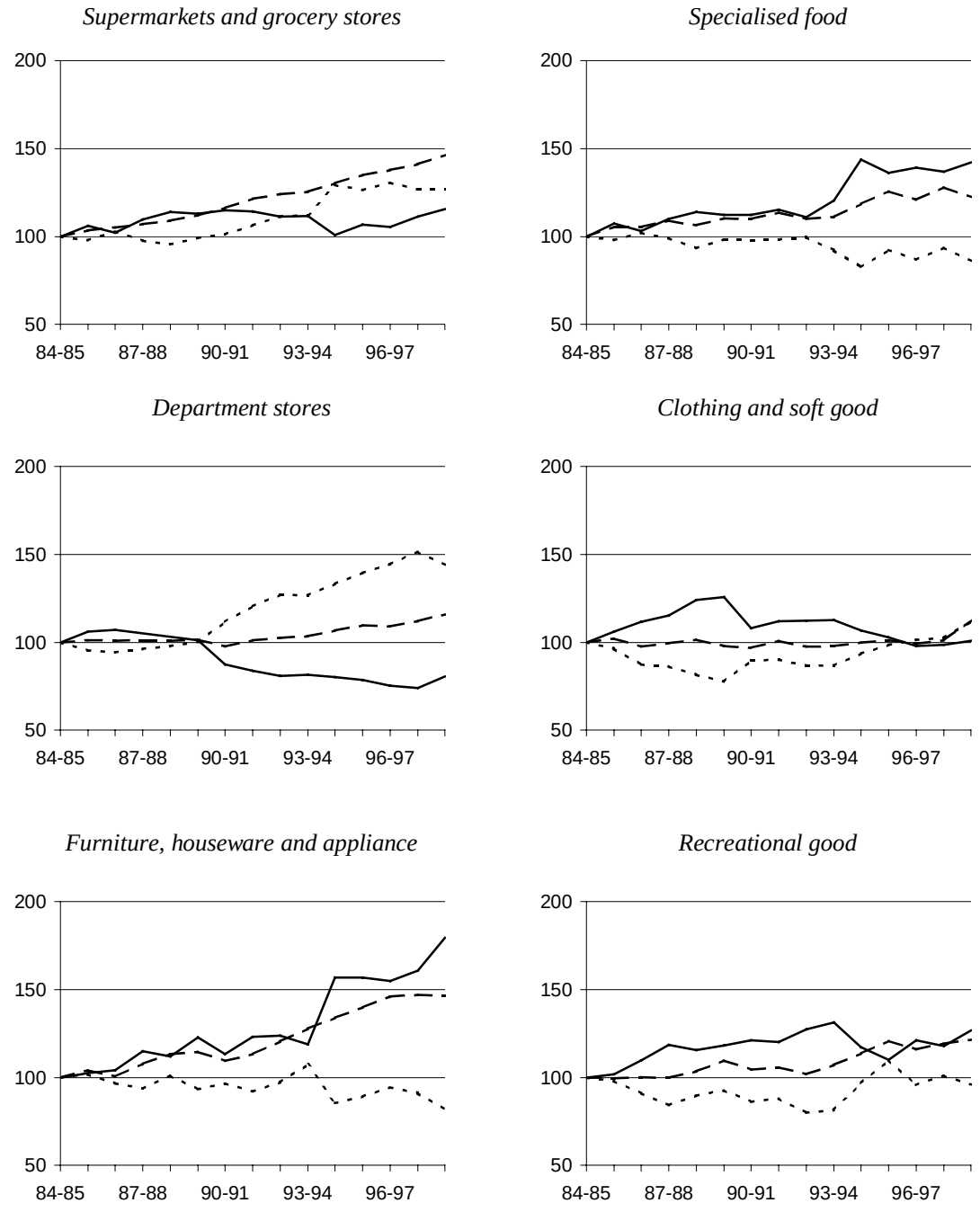
Broad impressions about retail industry groups can be drawn from figure 5.1. Perhaps the most striking feature is the extent of variation between retail groups.

Poor labour productivity performance was widespread in retail between 1984-85 and 1991-92, with only Supermarkets and grocery stores, Department stores and Other personal and household goods recording positive growth. Of these, Department stores achieved the strongest growth at 2.7 per cent a year (table 5.2).

The growth in Supermarkets and grocery stores and Department stores reflected low growth in hours worked relative to output growth. In the case of Department stores, there was a large decline in hours worked. High output growth was a strong influence on productivity growth in Other personal and household goods.

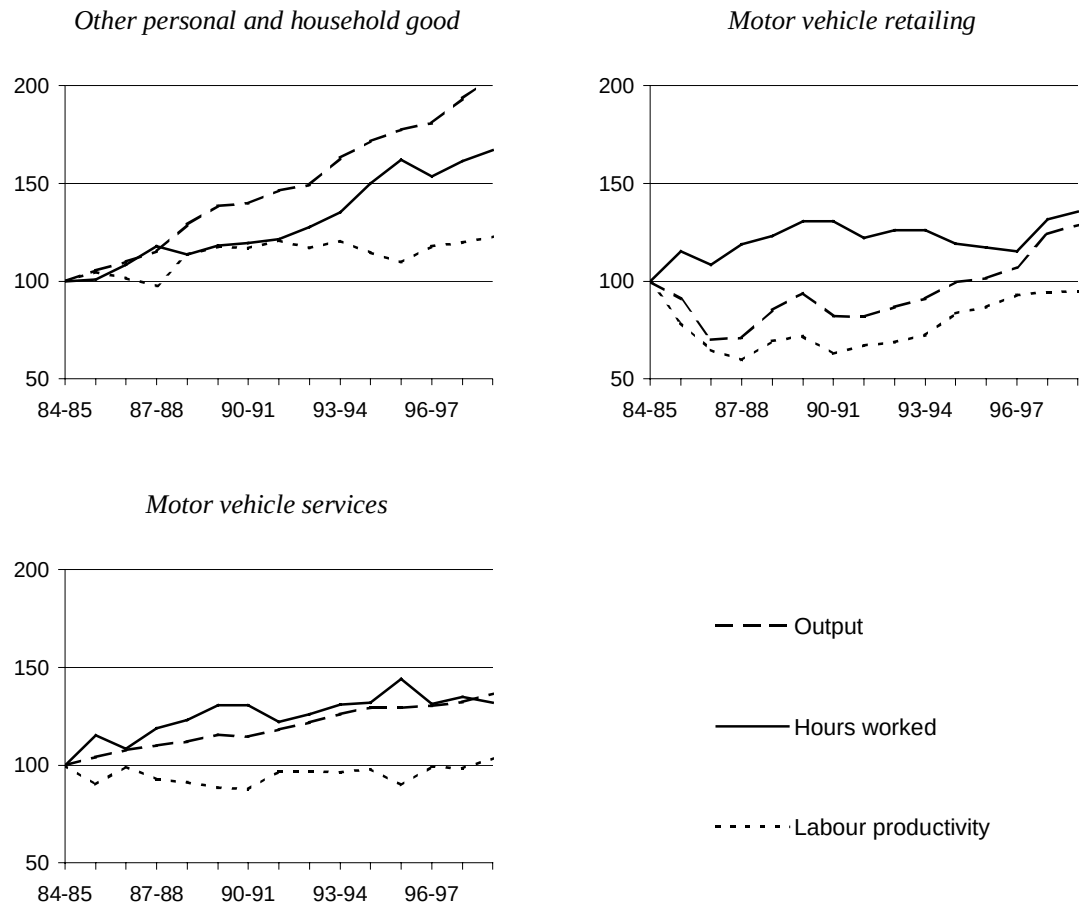
Figure 5.1 **Retail indexes of output, hours worked and labour productivity, 1984-85 to 1998-99**

Index 1984-85 = 100



(Continued on next page)

Figure 5.1 **(Continued)**



Data source: Based on unpublished ABS data.

The declining labour productivity in the other industry groups reflected higher growth in hours worked than in output (table 5.2).

The best performing groups in terms of retail productivity growth in the 1990s were Supermarkets and grocery stores (from 0.9 to 2.6 per cent); Clothing and soft goods (from -1.5 to 3.1 per cent); Recreational goods (from -1.8 to 1.2 per cent) and Motor vehicle retailing (from -5.5 to 5.1 per cent).

Table 5.2 **Retail growth rates in output, labour input and labour productivity, 1984-85 to 1998-99[a]**

Per cent

Industry	1984-85 to 1991-92			1991-92 to 1998-99		
	Output	*Hours worked*	*Labour productivity*	*Output*	*Hours worked*	*Labour productivity*
Food						
Supermarkets and grocery stores	2.8	1.9	0.9	2.7	0.1	2.6
Specialised food	1.8	2.1	-0.2	1.1	3.0	-1.9
Personal and household good						
Department stores	0.2	-2.5	2.7	2.0	-0.6	2.6
Clothing and soft good	0.1	1.6	-1.5	1.6	-1.5	3.1
Furniture, houseware and appliance	1.8	3.0	-1.2	3.8	5.5	-1.7
Recreational good	0.8	2.7	-1.8	2.0	0.7	1.2
Other personal and household good	5.6	2.8	2.7	4.9	4.7	0.2
Motor vehicle						
Motor vehicle retailing	-2.8	2.9	-5.5	6.7	1.5	5.1
Motor vehicle services	2.4	2.9	-0.5	2.1	1.1	1.0
Total	**1.5**	**2.0**	**-0.5**	**2.9**	**1.8**	**1.1**

a Difference between growth rates in this table and those for the retail sector in table 3.4 are explained in appendix A.

Source: Estimates based on unpublished ABS data.

In terms of the contributions to the retail productivity improvement in the 1990s (table 5.3), the important industry groups were Clothing and soft goods, Recreational goods, Motor vehicle retailing and Motor vehicle services. These industries all made negative contributions to average retail sector labour productivity in the first period, but turned positive in the 1990s. These improvements resulted from significant reductions in labour input growth shown in table 5.2. In the case of Motor vehicle retailing, there also was a large increase in output growth. These retail classes warranted closer scrutiny during the industry consultations (see boxes 5.1 to 5.4 below).

Supermarkets and grocery stores improved labour productivity growth in the 1990s by sustaining output growth and reducing growth in hours worked.

Table 5.3 **Retail industry contribution to output, labour input and labour productivity, 1984-85 to 1998-99**[a]

Percentage points and (per cent)[b]

Industry	*1984-85 to 1991-92*			*1991-92 to 1998-99*		
	Output	*Hours worked*	*Labour productivity*	*Output*	*Hours worked*	*Labour productivity*
Food						
Supermarkets and grocery stores	0.5	0.3	0.2 (-60)	0.5	0.0	0.5 (34)
Specialised food	0.2	0.4	0.0 (12)	0.1	0.6	-0.3 (-18)
Personal and household good						
Department stores	0.0	-0.2	0.3 (-109)	0.2	0.0	0.3 (20)
Clothing and soft good	0.0	0.1	-0.1 (47)	0.1	-0.1	0.3 (19)
Furniture, houseware and appliance	0.1	0.2	-0.1 (34)	0.3	0.4	-0.1 (-9)
Recreational good	0.0	0.2	-0.1 (34)	0.1	0.0	0.1 (5)
Other personal and household good	0.5	0.3	0.3 (-109)	0.5	0.5	0.0 (2)
Motor vehicle						
Motor vehicle retailing	-0.3	0.2	-0.6 (214)	0.7	0.1	0.5 (37)
Motor vehicle services	0.4	0.5	-0.1 (29)	0.3	0.2	0.2 (11)
Total	**1.6**	**2.0**	**-0.3 (100)**	**2.9**	**1.7**	**1.4 (100)**

[a] For output and labour productivity, output shares from the 1991-92 retail census were used to weight growth rates. Unpublished ABS data were used to weight hours worked. [b] On their own, percentage change contributions can be confusing. For example, the contribution of motor vehicle retailing to retail labour productivity growth in the first period was 214 per cent (reflecting a negative numerator and denominator) and 37 per cent in the latter period. This could convey a false impression — in reality, motor vehicle retailing has gone from a large detractor in the first period (-0.6 percentage points) to a large contributor in the second (0.5 percentage points).

Sources: Estimates based on unpublished ABS data; ABS 8625.0.

5.2 The productivity slowdown in the 1980s

Before examining the reasons and sources for the recovery in the 1990s, the productivity slowdown in the 1980s appears to have been an anomaly that requires an explanation.

Compared to 1974-75 to 1984-85, the slowdown between 1984-85 to 1991-92 was associated with a slight fall in output growth and a significant increase in labour input growth (chapter 3). Labour inputs grew in all retail industry groups with the

exception of Department stores, and most had falling labour productivity growth. (table 5.2).

Reform of trading hours

A key fundamental influence on retail productivity is changes in institutional arrangements such as retail trading hours. On this matter, one plausible explanation offered by Lowe (1995) for the general increase in hours worked in the 1980s was the deregulation of trading hours. Trading hours increased from an estimated 52 hours a week of general trading for Australia in 1980 to 56 hours in 1986 and 61 hours in 1992 (Kiel and Haberkern 1994).

According to Pilat (1997), who examined regulation and the distribution sector in OECD countries, many changes flow from more liberal trading hours. The employment effects of longer opening hours are positive due mainly to an increase in labour required to keep a store open longer. Part-time employment typically rises, although the extent depends on regulations restricting employees from working more hours and the pay premium for evening and weekend hours. Pilat concluded that the combined effect of higher employment and only slightly higher sales could lead to a small reduction in labour productivity, since labour may not be as intensively utilised.

The Australian experience indicates that, while labour input grew in general in the 1980s, there was considerable variation amongst retail industries. For instance, hours worked grew strongly in household goods and furniture, but was modest for Supermarkets and grocery stores and Clothing and soft goods. And, it fell in Department stores.

These outcomes suggest that perhaps several factors were at play. In the case of supermarkets, there may have been market share effects. For example, Pilat (1997) found that more liberal opening hours strengthen the position of large firms, as these are generally better able to respond to longer opening times. Some small shops (convenience stores) may gain, but the majority lose market share to larger shops. The dominance of the three main supermarket chains in the food segment of the Australian market is reflected by smaller supermarkets and general food stores losing market share (see PC 1999a).

While trading hours clearly can affect retail industries, it is questionable to characterise deregulation of trading hours as purely a 1980s ‘shock’. For example, while deregulation in Victoria commenced in the 1980s, most of the major reforms occurred in the early 1990s (chapter 2). Indeed, deregulation of trading hours is *currently* a major issue confronting many jurisdictions as part of their National

Competition Policy legislation reviews. Moreover, not only does the extent of liberalisation of trading hours vary between States and Territories, but also within States (for example, tourist precincts) and by retail establishment (for example, take away food outlets traditionally always have been little affected by trading hours restrictions).

While deregulation may have been a general factor in increased labour input, industry consultations revealed other considerations in specific industries. These include:

- The strong increase in labour input in motor vehicle services (see tables 5.2 and 5.3) may have been related, in part, to the ageing of the car fleet from around 7 to 11 years in the early 1980s. The level of servicing (and labour) required to maintain a vehicle increases as it ages.
- Some industries with relatively low productivity expanded rapidly during the 1980s. For example, industry representatives considered that parts of the takeaway food industry, such as McDonalds, 'boomed' during the 1980s. Lowe (1995) found that employment in stores selling bread and cakes grew particularly strongly, in part as a result of the deregulation of baking hours in the mid-1980s.

However, as noted above there were exceptions to the general fall in labour productivity in the 1980s, most notably in Department stores and Supermarkets and grocery stores.

- For Supermarkets and grocery stores, industry representatives highlighted the significant impact technology had on limiting the increase in labour input in the 1980s. Scanning allowed staff to deal with customers more quickly at the check-out and computerisation reduced the labour input required in other areas such as accounts. Scanning was introduced in 1982, rolled-out in 1985 and completed in 1987.
- In the 1980s, department stores came under considerable competitive pressure from the 'category killers' such as Harvey Norman. Department stores responded by rationalising product lines because, in an environment of high shopping centre rents, they were less able to afford to carry a wide range of products requiring large amounts of space (such as furniture and whitegoods).

On balance, the jury is still out in terms of the impact of deregulation on retail productivity. It is likely to have been one of several factors affecting labour inputs and labour productivity during the 1980s. And, there is the problem of 'ascertaining' the counterfactual. For example, the low growth in hours worked in some sections of retailing could reflect technology and substitution effects

swamping trading hours effects. It is possible that, without trading hours reforms, the growth in hours worked in the 1980s may have been lower again.

5.3 Productivity growth in the 1990s

Compositional shifts

Labour productivity varies among retail industries — even if all firms are at 'best practice' — so that changes in the industry mix could affect overall retail sector productivity.

In the 1990s, some retail groups with high labour productivity levels such as Motor vehicle retailing grew rapidly (in terms of output) compared with low labour productivity industries such as Specialised food (table 5.4).

Table 5.4 **Retail labour productivity levels, 1991-92 to 1998-99**

Industry	*Output per hour worked 1991-92*	*Industry share of retail output 1991-92*	*Annual average output growth 1991-92 to 1998-99*
	$	%	%
Food			
Supermarkets and grocery stores	*11.01*	18.1	2.7
Specialised food	7.20	13.6	1.1
Personal and household good			
Department stores	*15.40*	10.7	2.0
Clothing and soft good	9.81	8.3	1.6
Furniture, houseware and appliance	9.48	7.6	*3.8*
Recreational good	8.20	5.0	2.0
Other personal and household good	9.68	9.8	*4.9*
Motor vehicle			
Motor vehicle retailing	*15.73*	10.2	*6.7*
Motor vehicle services	8.20	16.1	2.1
Retail industry	9.83	100.0	2.9

Sources: Estimates based on unpublished ABS data; ABS 8625.0.

However, overall the evidence that the improved productivity performance in retail reflects compositional shifts is not very conclusive. Retail groups which had above average labour productivity (output per hour worked) in 1991-92 included Supermarkets and grocery stores, Department stores, and Motor vehicles. While all of these groups were significant in terms of their share of retail output, only Motor

vehicles outperformed the retail sector as a whole in terms of output growth in the 1990s. Other strong output growth performers included Furniture, hardware and appliances, and Other personal and household goods, which had below average labour productivity.

This suggests that other factors were important for the improvement in retail productivity in the 1990s.

Immediate influences on productivity

Rationalisation

The considerable rationalisation in many retailing industries during the 1990s was an important factor contributing to labour input savings. Rationalisation allowed retailers to benefit from economies of scale and also to specialise to attract particular groups of buyers (for example, teenagers and fitness 'fanatics') by offering higher level of targeted service at competitive prices.

Rationalisation was an important factor in improving productivity in Motor vehicle retailing, where the number of dealerships fell significantly. In Motor vehicle services, the number of service stations also fell substantially (box 5.1).

There has been rationalisation in many other parts of retail with a trend away from small individual stores (small boutiques) toward large specialty chains (such as Just Jeans) to take advantage of economies of scale in the supply chain and better store management systems. This is consistent with the findings of McKinsey and Company (1995) which stated that retailing is evolving through three stages of increasingly productive formats — small individual stores, large non-specialised stores and specialised chain stores.

Technology

Technological change (such as scanning and computerisation) has influenced retail productivity by reducing labour input and changing management systems.

Technology has reduced the amount of time staff take to serve a customer, keep accounts and control inventory. The scanner at the checkout and the single operator-console at service stations are obvious examples of labour saving technology. While the roll-out of scanning technology was completed in some major chain stores (for example, Coles Myer) in 1987, it spread to smaller retailers during the 1990s (industry consultation).

Changes in management systems also led to substantial productivity improvements in the 1990s, particularly in supermarkets. In the 1980s, technology had a significant impact by saving labour input. In the 1990s, it changed the way management assessed performance.

Box 5.1 Industry focus: motor vehicle services retailing

The main industries included in this category are Automotive fuel retailing (service stations), Smash repairs and Automotive repairs & services (not included elsewhere).

There has been considerable rationalisation of service stations from around 20 000 in 1970 to around 8000 by the late 1990s. As a consequence, the average volume of retail sales per site increased from 149 000 litres a month in the early 1980s to 267 000 litres a month in 1996 (ACIL 1997).

Competition increased in the 1990s, resulting in cost cutting strategies and improvements in productivity. Changes in the petroleum supply chain led to the growth of independent retailing networks. Distributors gained better access to terminals as a result of the ACCC ruling from the 1994 Ampol-Caltex merger and the establishment of large scale independent import terminal operations (appendix C). These changes provided distributors and wholesalers with an alternative supply source from the major oil companies. The changes allowed independent retailers to price their fuel more competitively and grow. While some independents left the market during the 1990s, new entrants, such as Woolworths, made a significant impact.

The move toward self service, which began in the 1980s, and the wide-spread adoption of new technology — notably the single-operator console and associated systems — provided an additional avenue for savings in labour input in the 1990s.

Specialisation has increased labour productivity in providing motor vehicle services. Service stations became specialists in fuel retailing (although recently there has been a trend to incorporate convenience stores), while large specialised centres were established for services related to tyres, batteries and exhaust systems.

There has been a shift in motor vehicle servicing from the service station to the dealer. Typically these establishments are larger, handling a greater throughput than their predecessors of the 1980s. Technology improved labour productivity in motor vehicle servicing, with electronic diagnostic systems at the service centre and in the motor vehicle. For example, the computing system in some vehicles is so sophisticated the labour required to find and fix a problem has dropped by half. However, in many cases, high throughput is required to recoup the fixed cost of the equipment.

The number of body repair shops has been rationalised and the shops have become larger. Smash repairers have adopted less labour intensive techniques, such as body panel replacement rather than panel beating.

Sources: ACIL (1997); industry consultations with the Motor Trades Association of Australia; Australian Petroleum Agents and Distributors Association.

For instance, one supermarket chain noted that management's focus had gradually changed from broad productivity indicators (such as percentage of turnover) to narrower, more targeted indicators (such as throughput by item value relative to labour input). In the mid-1990s, management systems focussed more on the task level in order to assess labour productivity. This approach provided a significant lift to profitability and the ability to cut costs appropriately.

The improvement in technology made the collection of information required to monitor performance easier and, with software developments, enabled management to analyse micro-productivity indicators in real time. Stores below a task benchmark standard (taking into account mitigating factors) were encouraged to improve their performance.

Integration of the supply chain

Discussions with retail trade representatives suggest that the supply chain became more closely integrated in the 1990s. Integration of the supply chain led to a productivity improvement with competition as the catalyst and technology as the enabler — (see box 5.2).

Box 5.2 **Industry focus: clothing and soft goods retailing**

According to industry representatives, clothing stores have faced intense competition from the category killers such as Rebel Sport in the 1990s. The number of entry and exits is very high, indicating the highly competitive nature of the industry.

The category killers have fewer staff relative to store turnover, high technology input and a store format which is very labour efficient. The specialised chain stores have followed these trends to reduce labour input. Speciality chains such as 'Best and Less' and 'Lowes' have increased productivity by offering lower levels of service and now have very low staff levels relative to turnover.

By targeting precise groups of customers and selling a well defined range of merchandise, specialised clothing chain stores are able to tailor their product and service to their clientele.

Labour input in the clothing retail industry has been reduced with the trend toward self service, changes in the store format and technology spreading from large to smaller retailers.

Technology is also playing an important role in integrating the clothing industry supply chain. For example, 'Noni B' apparel is integrated from production to retail. These links are facilitated by technology (scanning and EDI), with sales data flowing through from point of sale to the production facility.

Sources: Industry consultations with Australian Retailers Association; Australian Centre for Retail Studies; Coles Myer Ltd.

For the motor vehicle retailing industry, technology has improved productivity within the dealership and through the supply chain. In the clothing industry, improved electronic data interchange has allowed retailers and manufacturers to work together more closely (box 5.2). This has allowed greater responsiveness to changing consumer preferences and reduced the carriage and manufacture of stock not sought by consumers.

Underlying influences on productivity

Competition

Industry representatives identified strong competition as an important underlying incentive to increased productivity in the 1990s. Competition is viewed as a key factor influencing rationalisation, investment in technology, the integration of the supply chain and the adoption of better management practices.

The importance of competition for productivity was raised in most of the industry consultations. For example:

- further deregulation of trading hours increased competition across retail generally, which has reinforced a trend to larger stores;
- in the clothing and recreational goods retailing industries, the emergence of 'category killers' led to intense competition (see box 5.3);
- in the car industry, lower tariffs on motor vehicles led to an increase in imports, particularly in the small cars car market, and dealers have been under greater pressure from suppliers to meet annual sales targets; and
- in the fuel retailing industry, the growth of independent retailing networks (for example, Woolworths) has increased competition.

Box 5.3 **Industry focus: recreational goods retailing**

Retailers included in this category sell products such as newspapers, books and stationary, sport and camping equipment, toys and games, and marine and photographic equipment. Most industry participants thought that trends in hours worked, output and labour productivity probably reflected the emergence of the category killers such as 'Toys 'R' Us', 'Rebel Sports' and 'Office Works'.

'Office Works' is an example of a category killer in stationary. It began in 1995 and is a large destination store benefiting from economies of scale by offering a wide range of products at highly competitive prices. These stores are very labour efficient with a self serve format and high investment in technology to reduce the amount of time staff take to serve a customer, keep accounts and control inventory. A significant number of customers are attracted to these stores because of the wide product range and low prices. This results in higher sales volume, reduced idle staff time and increased labour productivity.

Improvements in productivity have flowed from the 'category killers' to smaller retailer.

Sources: Industry consultations with Australian Retailers Association; Australian Centre for Retail Studies; Coles Myer Ltd.

Demand

The strong output growth in the 1990s appears to be consistent with an increase in sales. Many retail products are discretionary goods (for example, clothing and cars) with sales increasing rapidly in periods of strong economic growth (box 5.4).

However, strong economic growth was only part of the demand story. Industry consultations revealed that other factors, such as low inflation and interest rates, were also important for growth to be translated to higher levels of consumer confidence and increased sales.

Strong, sustained economic growth in the 1990s had much broader implications than simply increasing sales. Retailers had the confidence to make investment decisions to enhance long term productivity and increase capacity utilisation, and had the opportunity to reap the benefits from economies of scale.

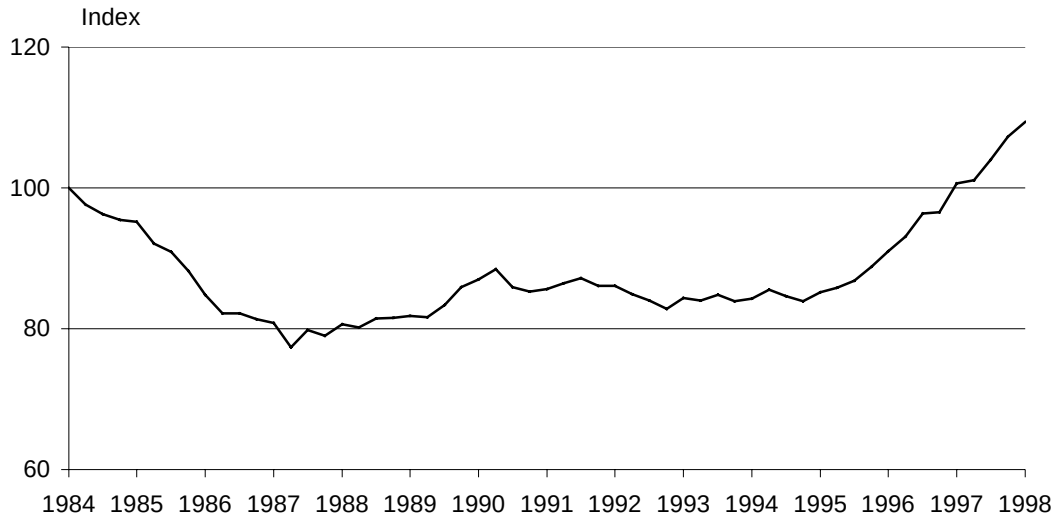
Box 5.4 **Motor vehicle retailing**

The very strong growth in output for Motor vehicle retailing is closely linked to the dealer's margin and number of sales. The retail margin on most sales of new vehicles is small and to a large extent determined by the supplier. Motor vehicle manufacturers and importers want to sell more vehicles because there are large fixed costs in manufacturing and profits are linked to the volume of sales. Consequently, in the 1990s there was increasing supplier pressure on dealers (most are franchised with a manufacturer) to meet higher annual sales targets. New car registrations increased from 430 874 in 1990-91 to 671 513 in 1998-99 (appendix C).

The strong growth in new motor vehicle sales in the 1990s appears to have been associated with an increase in the affordability of cars (see figure below). Affordability is defined as average weekly earnings divided by the price of cars. However, other factors such as the level of interest rates also influence the demand for motor vehicles.

Car affordability, 1984 to 1998

Index December 1984 = 100



Data sources: DIST (1995); DISR (1999b).

Competition in Motor vehicle retailing increased in the 1990s, mainly as a result of the fall in tariffs on imported passenger motor vehicles from 40 per cent in 1990 to 15 per cent in 2000. As a consequence, the import share of the new passenger motor vehicle market increased from 25 per cent in 1990 to 53 per cent in 1998 (DISR 1999b).

The increase in competition has been greatest in the small car market. As a result of competition, the relative share of small cars in the passenger motor vehicle market increased from 27 per cent in 1988 to 37 per cent in 1996.

(Continued on the next page)

Box 5.4 **(Continued)**

Competition spread through the supply chain to individual dealerships. Worldwide production over-capacity and over-supply has been compounded by the decrease in demand in Asia following the economic slowdown in the late 1990s. Consequently, suppliers (manufacturers/importers) placed considerable pressure on individual dealerships to meet annual sales targets or, ultimately, face the loss of supply to another franchised dealer.

Rationalisation of the Motor vehicle retailing industry in the 1990s was an important factor contributing to labour input savings.

The number of dealerships and sites fell from 2650 dealers and 3650 sites in 1984 to around 1500 dealers and 1800 sites in 1999. Rationalisation was a response to increase the number of sales per dealership, remain viable and meet supplier's targets. To help increase volumes, it is now common for dealers to sell more than one manufacturer's product. Dealers have also diversified into the profitable activities of providing finance and motor vehicle servicing. Rationalisation has also been promoted by suppliers as a means of improving the management of their sales network.

Technology has improved productivity within the dealership and through the supply chain. As a result of increased computerisation and electronic data interchange (EDI) with suppliers, dealers have been able reduce the amount of labour input required to manage accounts, inventory and track new stock.

Closer links between dealers and manufacturers/suppliers through EDI and JIT have reduced the number of 'hard to sell' vehicles. A simple example is a supplier providing orange vehicles which, according to dealers, are notoriously difficult to sell. Now days this problem may be avoided as dealers can increasingly order a vehicle, based on a customer's specifications, from the manufacturer and expect prompt delivery.

The use of EDI to share information between dealers and the supplier has reduced the costly practice of vehicle swaps. According to Inchcape Motors Australia (importer of Jaguars, Subarus and Peugots), 40 per cent of all cars sold used to be swapped among their dealers in order to meet a particular vehicle specification required by a customer. The practice leads to considerable double handling which increases labour input, transport costs and the risk of vehicle damage.

Sources: DISR (1999b); industry consultations with P. Dapiran; Inchcape Motors Australia; Motor Trades Association of Australia.

Fundamental influences on productivity

As noted in section 5.2, changes in government policies affecting trading hours have had significant impacts on many areas of retailing, in many jurisdictions. This trend is likely to continue for some time.

As Pilat (1997) observed, deregulation of trading hours typically leads to an increase in part time and casual employment (section 5.2). Certainly, an increasing trend away from full time employment is born out in the data for the retail sector (see chapter 2).

However, more recently, reforms to industrial relations legislation, which have increased the focus on enterprise-based work conditions, may have facilitated a trend to more permanent employment — at least in large supermarkets. For instance, in submissions to a recent Productivity Commission inquiry (1999a, p. 259), Woolworths claimed that casual employees in Victoria declined from 50 per cent in 1993 to a current figure of 18 per cent and, in New South Wales, from around 50 to 30 per cent over the same period.

Similalry, Coles said:

> … over the past four years Coles has moved away from the traditionally heavy casual component of our supermarket workforce, and increased our reliance on full time and permanent part time employees.

Coles signalled that this move derived from recent enterprise agreements which allowed for better customer service whilst also improving job security and career opportunities.

This trend, may in part, reflect the impact of health and hygiene standards governing the storage and handling of perishables. These standards are said to have significantly increased employers' training investments for staff handling food in supermarkets. This is said to have encouraged employers to seek more permanent relationships with employees (industry consultation).

Other fundamental influences on productivity in retail include the more 'nebulous' notion of changing social attitudes. For example, as discussed in chapter 2, extended weekend trading is increasingly being offered as a family-oriented entertainment or recreational activity. The increasing number of dual income households and women in the workforce (leading to an increase in dine in, take away and pre-prepared meals) and the greater affluence of the 'high spending' youth market (for example, reflected by recreational clothing/sportswear stores) are further examples of social changes which have affected retailing.

Overall, the retail sector appears to be taking advantage of increased flexibility both in trading hours and an enterprise focus in industrial relations. This flexibility also suits those seeking part-time and 'non-traditional' hours of work (for example, students and working parents).

5.4 Conclusion

The productivity slowdown of the 1980s in the retail sector appears to be an aberration from long term trends. Industry specific factors may be more important in explaining the slowdown than the deregulation of trading hours.

While the improvement in productivity for the retail trade was not as great as that for the wholesale trade, industry consultations point to an acceleration in productivity growth during the late 1990s. A reasonably consistent set of productivity determinants in most industries was identified from industry consultations. The main underlying factors were competition and demand, while the main immediate causes were rationalisation leading to economies of scale and technology.

A Data sources

A number of issues are addressed in this appendix. They include:

- data sources and data manipulation;
- the differences between output and labour input growth rates in chapter 3 (based on 1-digit data) and those in chapters 4 and 5 (based on aggregated industry data at the 2 and 3 digit level) (table A.1); and
- the inconsistencies in labour productivity trends when using different data sources.

In summary:

- The ABS 1991-92 wholesale survey and retail census provide the best estimates of industry output shares to examine the composition of the sectors.
- The trends derived from dissagregated data should be viewed more cautiously than trends based on 1-digit level data. This is particularly the case for wholesale trade output because of changes in the classification system, gaps in these data and different methods used by the ABS to estimate wholesale output over the period.
- Differences in growth rates, based on data at the 1-digit level and aggregated industry data, relate to modifications made by the ABS to 1-digit level data. The ABS considers estimates of output and labour input based on data at the 1-digit level to be more accurate.
- The issue of compatibility of data sources concerns problems in comparing time series national accounts data with wholesale survey data. The wholesale surveys provide snapshots of the sector at particular points in time, while national accounts provide time series data. Further, the two wholesale surveys are not directly comparable because of changes in survey methodology.

A.1 Sources

The ABS classifies industries using the Australian and New Zealand Standard Industrial Classification (ANZSIC) (ABS 1292.0) which, in 1993, replaced the Australian Standard Industrial Classification (ASIC). The structure of both

classifications comprises four levels, namely 'Division' (the broadest level referred to as 1-digit), 'Subdivision' (2-digit), 'Group' (3-digit) and 'Class' (4-digit).

A list of the industries included in each level is provided in tables 4.1 and 5.1.

Data for sector-wide trends

Trends for the wholesale and retail sectors at the division (1-digit) level were based on ABS estimates from the national accounts using an income approach (that is, wages plus gross operating surplus plus net indirect taxes). These data series covered output, hours worked and capital services. The national accounts gross product (output) estimates were an income based measure and from 1994-95 were benchmarked to input/output supply use data.

Data for sub-sector composition and trends

When examining issues relating to the composition of the wholesale and retail sectors, the ABS 1991-92 wholesale survey and retail census provide the best estimates of industry output shares.

Trends in disaggregated industry data for output, hours worked and investment for both the wholesale and retail trades as well as wholesale sales were obtained from the ABS by request.

At the 2- or 3-digit level output (industry gross product) is derived by the ABS using the production approach (that is output less intermediate inputs). The method used by the ABS to derive industry output data series was based on a quarterly survey of sales or turnover and weighted using the wholesale survey or retail census.

For retail, chain volume estimates of output (industry gross product) were available from ABS for the period 1984-85 to 1998-99, at the group (3-digit) level of disaggregation and on an ANZSIC basis.

However, obtaining output estimates for wholesale was more problematic. A consistent disaggregated time series for wholesale output was not available for the period 1984-85 to 1998-99. Therefore, a time series for wholesale 2-digit output was constructed using two ABS data sets — ANZSIC and ASIC data. The steps taken to construct the series included:

- The two data sets were obtained.

- Chain volume estimates of industry gross product (on an ANZSIC basis) were only available from the September quarter 1994, and only a subdivision or subsector (2-digit) level of disaggregation could be achieved.
- Constant price value added estimates of gross product were available from ABS for the period September 1984 to September 1994 on an ASIC basis. Unfortunately, the ASIC classifications did not correspond to the post 1994 2-digit ANZSIC classifications. Consequently, a mix of 3- and 4-digit ASIC classifications (although not a complete set) were aggregated in an attempt to match the 2-digit ANZSIC classifications as closely as possible.

- The two time series were spliced (using the overlapping September quarter 1994 and backcasting using year-on-year percentage changes in the ASIC series) to provide an indicator of changes in wholesale output on a 2-digit ANZSIC basis from 1984-85 to 1998-99.

Data for hours worked in both the wholesale and retail trades were obtained from the ABS, by request, from 1984-85 to 1998-99 at the 3-digit level of disaggregation and on an ANZSIC basis.

Wholesale sales data at current prices were obtained from the ABS from 1988-89 to 1998-99 at the 3-digit level and on an ANZSIC basis. These data were converted to a constant price series (1997-98 base year) by applying an implicit GDP price deflator from the ABS National Accounts (ABS 5204.0) sourced from the ABS National Accounts database on EconData.

Reasonably consistent time series for investment in both the wholesale and retail trades were constructed on an ANZSIC basis for the period 1984-85 to 1998-99 using capital expenditure data obtained from the ABS. The time series were constructed using estimates of total expenditure by ASIC 2-digit industries for the period 1983-84 to 1993-94, ANZSIC 3- and 2-digit industries for the period 1987-88 to 1998-99 and expenditure by type in ANZSIC 2-digit industries for the period 1987-88 to 1998-99. Because of data limitations, the ASIC data were reclassified to ANZSIC on broad correspondence rather than precise concordances. The nominal data provided by the ABS were converted to a constant price series (1997-98 base year) by applying a gross fixed capital formation (GFCF) implicit price deflator from the ABS National Accounts (ABS 5204.0) sourced from the ABS National Accounts database on EconData.

Differences in output shares

The 1991-92 wholesale survey and retail census provide the best estimates of industry output shares. For retail, the output shares in 1991-92 from the time series

data closely matched the 1991-92 retail census output shares. However, wholesale trade output shares from the time series data did not match the 1991-92 wholesale survey output shares.

The concordance problems from the ASIC series and backcasting led to distortions in wholesale output shares. Output shares estimated using the backcasting method from 1991-92 output trend data for Machinery & motor vehicle wholesaling and Personal & household goods wholesaling did not match those in the 1991-92 wholesale survey. The estimated output share was 31 per cent for Machinery & motor vehicle wholesaling (but 38 per cent from the 1991-92 survey) and 38 per cent for Personal & household goods wholesaling (31 per cent in the 1991-92 survey). Consequently, output shares from the wholesale survey were used when estimating an industry's contribution to sectoral productivity growth.

A.2 Compatibility

National accounts versus aggregated industry time series

There were differences between output and labour input growth rates in chapter 3 (based on 1-digit estimates from the national accounts) and those in chapters 4 and 5 (based on aggregated industry data at the 2- and 3- digit level).

According to the ABS, there are two main reasons for the differences in output growth rates. First, the 1-digit national accounts data are a more accurate (income based) measure of output than the aggregated industry data (derived using the production approach). Second, the method ABS uses for estimating (2- or 3- digit) wholesale and retail industry output means that the aggregated series is likely to become less reliable the further from the survey/census year (figures A.1 and A.2).

For hours worked, there was only a slight difference between 1-digit and aggregated (3-digit) wholesale and retail industry data (figures A.3 and A.4). The differences arise as a result of modifications made by the ABS to the 1-digit hours worked data used in the national accounts.

Time series versus surveys/censuses

The issue of compatibility of data sources used to measure wholesale productivity was highlighted by Lowe (1995). While the compatibility between data sources appears to be less of a problem in the retail sector, different data sources show quite different pictures of productivity trends in the wholesale sector.

There are two principal sources of data to measure wholesale output and labour input. The first source involves surveys of the wholesale industry undertaken by the ABS for 1981-82 and 1991-92 to provide information on output and employment by industry. The second source involves measuring labour productivity at the sectoral level using output data from the national accounts and labour input from the Labour Force Survey. The survey data provide comprehensive snapshots at particular points in time, while the national accounts provide time series data.

According to the ABS, the two wholesale industry surveys in 1981-82 and 1991-92 are not directly comparable because the latter was a survey of 'management units' and the former was a survey of 'establishments'. The ABS refers to a 'management unit' as a business or part of a business where separate and comprehensive accounts are compiled for it. For example, a company, partnership or sole operator or, in the case of a large diversified business, a 'division' or 'line of business' (ABS 8041.0 1994-95, p. 76).

A.3 Concordance

Information on the concordance is provided in table A.1. The following is a summary of the concordance problems and should be read in conjunction with tables 4.1 and 5.1. The main points include:

- The ASIC category to match the ANZSIC category Basic materials did not include Builders hardware dealers (that component was in Machinery & motor vehicle wholesaling).
- The ASIC category to match ANZSIC Machinery and motor vehicle wholesaling;
  - included Builders hardware dealers which should have in been in Basic materials wholesaling,
  - included Household goods which should have been in Personal and household goods wholesaling,
  - but did not include part of ASIC 486 Motor vehicle dealers and Motor vehicle parts wholesalers.
- The ASIC category to match ANZSIC Personal and household goods wholesaling should have included Household goods, but this category was included in Machinery and motor vehicle wholesaling.

Table A.1 **Wholesale trade concordance**

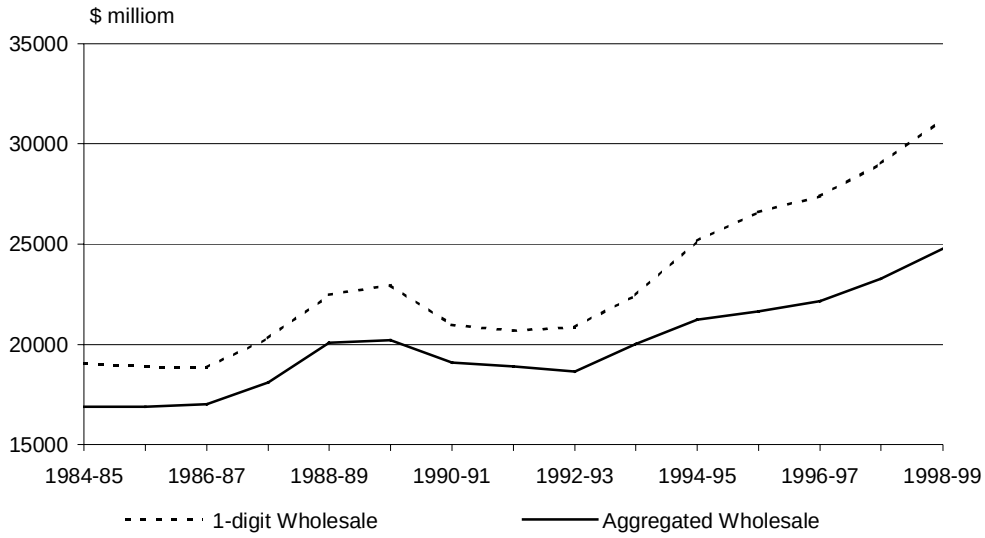
ANZSIC 2-digit	*ABS provided ASIC data* [a]	*Notes*
45 Basic materials wholesaling	Consists of: ASIC 474 Minerals metals and chemicals wholesalers (100 per cent concordance with ANZSIC 452); and ASIC 475 Farm properties and produce dealers nec (98 per cent concordance with ANZSIC 451)	The 2-digit category ANZSIC 45 Basic materials wholesaling includes[b] the equivalent 3-digit ANZSIC categories 451 Farm produce wholesaling, and 452 Mineral, metal and chemical wholesaling but excludes 453 Builders supplies wholesaling which is included in estimates of ANZSIC 46.
46 Machinery and motor vehicle wholesaling	Consists of: ASIC 472 Builders hardware dealers (93 per cent concordance with ANZSIC 453); ASIC 473 Machinery and equipment wholesaling (89 per cent concordance with ANZSIC 461); and ASIC 478 Household good wholesaling (100 per cent concordance with ANZSIC 473).	ANZSIC 46 Machinery and motor vehicle wholesaling includes[c] the equivalent of 3-digit ANZSIC 461 Machinery and equipment wholesaling and only has a small portion of ANZSIC 462 Motor vehicle wholesaling. However, it includes ANZSIC 453 Builders supplies wholesaling and ANZSIC 473 Household good wholesaling.
47 Personal and household good wholesaling	Consists of: ASIC 476 Food, drink and tobacco wholesalers (99 per cent concordance with ANZSIC 471); ASIC 477 Textile and clothing wholesalers (100 per cent concordance with ANZSIC 472); ASIC 471 General wholesalers (13 per cent concordance with ANZSIC 471, 40 per cent concordance with ANZSIC 472 and 47 per cent concordance with ANZSIC 479); and ASIC 479 Other specialist wholesalers (99 per cent concordance with ANZSIC 479)	ANZSIC 47 Personal and household good wholesaling includes[d] ANZSIC 471 Food, drink and tobacco wholesaling, ANZSIC 472 Textile, clothing and footwear wholesaling and ANZSIC 479 Other wholesaling, but excludes ANZSIC 473 Household good wholesaling which is in ANZSIC 46.

[a] Ratios are based on employment, a crude indicator of the output relationship between ASIC and ANZSIC categories. [b] According to the 1991-92 Wholesale Activity Survey, category 451 represents about 8 per cent of Industry Gross Product (IGP), category 452 represents 14 per cent of 1991-92 IGP and the missing category ANZSIC 453 represents 10 per cent of IGP. [c] Category 461 represents 27 per cent of IGP and categories 453 and 473 represented 14 per cent of IGP. The missing category ANZSIC 462 represents about 11 per cent of IGP. [d] Categories 471 and 472 represent about 15 per cent of 1991-92 IGP and category ANZSIC 479 represents 11 per cent of IGP.

Source: ABS 1292.0.

Figure A.1 **Wholesale, output, 1984-85 to 1998-99**

Comparison between 1-digit and aggregated industry data[a]

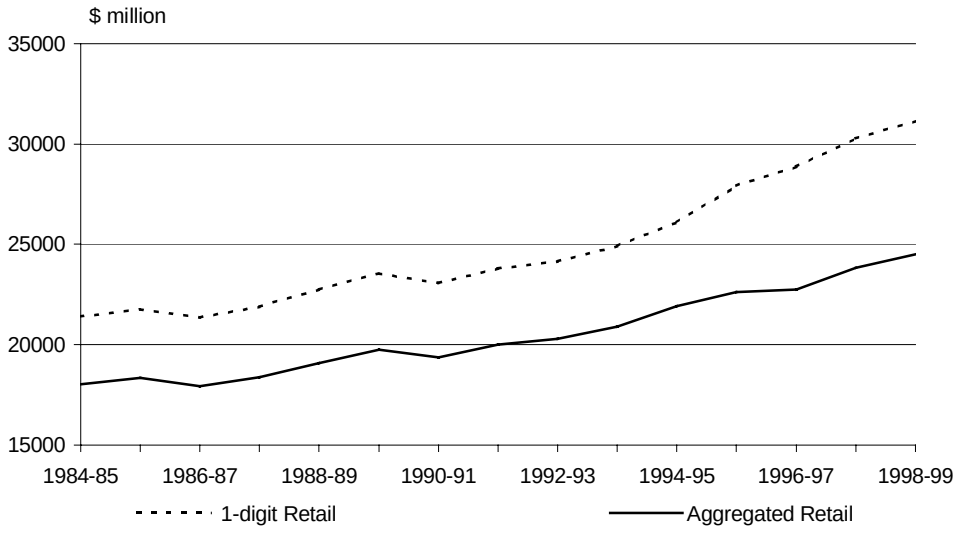


a The 1-digit data is Industry Gross Value Added (1997-98 prices, chain volume measure) taken from the ABS *National Accounts* while the aggregated estimate is based on disaggregated Industry Gross Product (1997-98 prices, chain volume measure) data supplied as a special request by the ABS.

Data sources: Estimates based on ABS National Accounts database on EconData; unpublished ABS data.

Figure A.2 **Retail, output, 1984-85 to 1998-99**

Comparison between 1-digit and aggregated industry data[a]



a The 1-digit data is Industry Gross Value Added (1997-98 prices, chain volume measure) taken from the ABS *National Accounts* while the aggregated estimate is based on disaggregated Industry Gross Product (1997-98 prices, chain volume measure) data supplied as a special request by the ABS.

Data sources: Estimates based on ABS National Accounts database on EconData; unpublished ABS data.

Figure A.3 **Wholesale, hours worked, 1984-85 to 1998-99**

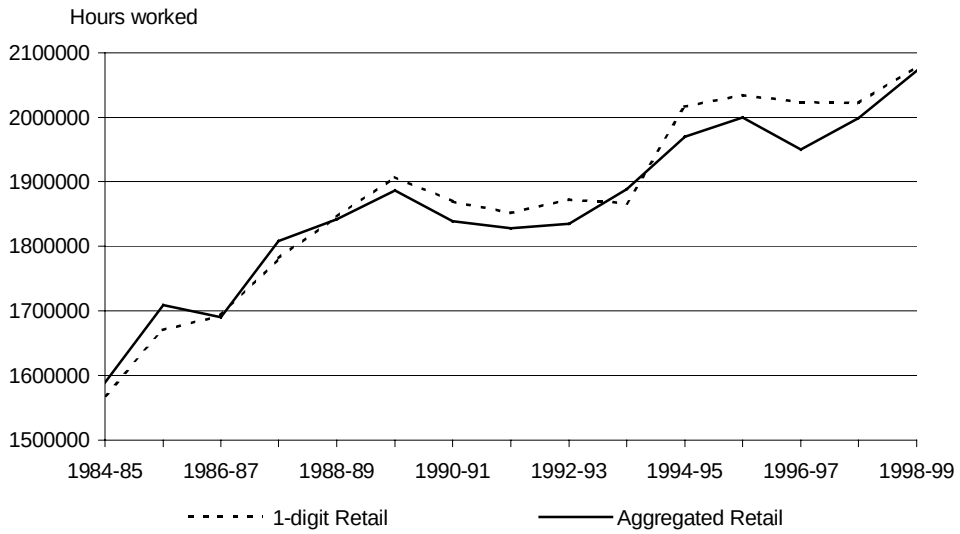
Comparison between 1-digit and aggregated industry data[a]

a The 1-digit data and the aggregated estimate is based on data supplied as a special request by the ABS.

Data sources: Estimates based on unpublished ABS data.

Figure A.4 **Retail, hours worked, 1984-85 to 1998-99**

Comparison between 1-digit and aggregated industry data[a]



a The 1-digit data and the aggregated estimate is based on data supplied as a special request by the ABS.

Data sources: Estimates based on unpublished ABS data.

B Measuring wholesale and retail productivity

This appendix sets out the output and input concepts used in productivity measurement.

Doubts have been raised about how accurately productivity in the wholesale and retail trade sectors is measured — particularly how well the output of these sectors is measured. The focus of this appendix is therefore on issues relating to the measurement of wholesale and retail trade output. As discussed below, the concept of output used by the Commission in calculating sectoral productivity is 'value added'. The appendix canvasses a number of issues concerning the measurement of wholesale and retail trade value added. First, there is the question of the extent to which changes in the mix and quality of services (for example, longer trading hours) are reflected in measured output. Second, there is a concern about the assumption that wholesale and retail value added remains a constant proportion of sales and turnover respectively, in years when value added in these sectors is not measured directly. Third, there is a particular issue concerning the estimation of Computer wholesaling value added.

In contrast, it seems generally accepted that the measurement of inputs is common among industries and there is no immediate reason to believe input measurement is any more difficult or less accurate in wholesale and retail industries than in others.

B.1 Concept and measurement of productivity

Productivity is a measure of the rate at which inputs are turned into output. The relationship between output of goods and services (O) and inputs (I) (for example, labour, capital, land, raw materials, management and so on) is usually expressed as the ratio: O/I. Output can be gauged against a single input (for example, labour productivity) or more than one input (multifactor productivity — usually labour and capital).

When the ratio of output to total inputs rises, it indicates an increase in productivity.

The building blocks for calculating productivity are measures of outputs and inputs. To measure productivity, outputs and inputs ideally should be measured in *physical* volumes. However, when physical volume cannot be directly measured, or the quality of outputs and inputs change over time, or a number of different outputs and inputs have to be added together — output and inputs can be estimated in 'real' value or volume terms. This is done by deflating current value series with an appropriate index of prices.

Changes in quality complicate the estimation of real output and inputs. Abstracting from the effects of inflation, an increase in quality will usually be reflected in an increase in price because of the increased value added stemming from the quality increase. Ideally, the price deflator used to convert the nominal value of output and inputs into real or volume measures should only include the price change for a constant quality, and not the price component that reflects changes in quality. An increase in quality will then be reflected as an increase in output or inputs, as the case may be.

If the price deflator includes a price component that reflects a change in quality, real output and productivity will not be measured accurately. To the extent that some quality improvement in output is not taken into account in the measure of pure price change, the extent of pure price change is overestimated and real output is underestimated, as is productivity.

While statistical agencies do not always take account of quality changes in goods and services, the Australian Bureau of Statistics (ABS) does its best to do so. For example, in the case of computers, the ABS uses hedonic price indexes compiled by the United States Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS).

B.2 Wholesale and retail trade output

The output of the wholesale and retail trade sectors is multifaceted. At one level the sectors provide a distribution service that links producers of final products and other producers and consumers. It is important to be clear that the actual goods sold by wholesalers and retailers do not constitute the output of these sectors. Rather, output is the service they provide in facilitating the transfer of ownership of goods from producers to end users, and in providing associated services.

Conceptually, wholesale and retail output can be thought of as having two dimensions (Betancourt, forthcoming). First, there is usually the transfer of property rights of final goods as they move through the distribution chain. The principal function of the distributive trades is to consummate a transaction — an exchange

that involves the transfer of property rights of goods (Oi 1998). Second, wholesalers and retailers provide a range of services in order to secure a sale. In a sense, the quantity and mix of these services define aspects of the quality of the distribution function provided by wholesalers and retailers.

Oi (1998) identifies the following services that retailers may provide in order to make a sale:

- a product line — an array of goods that is assembled and made available to consumers;
- convenience — reflecting store location, trading hours and the provision of price and product information;
- ancillary services — including delivery, credit and return privileges; and
- upstream integration — including packaging, processing and producing (for example, baked products in supermarkets).

Similarly, Betancourt and Gautschi identify five broad categories of retail distribution services: accessibility of location, assortment, assurance of product delivery in the desired form and at the desired time, information and ambience (Betancourt and Gautschi 1993).

The bundle of services provided by wholesalers may include some or all of the following:

- access to a product range;
- reliability — the speed and accuracy with which they are able to fill customer orders;
- customer service — including product information, credit etc; and
- storage and handling — their ability to store and move products without damage.

Typically, wholesale and retail output is measured when a sale or transfer of goods takes place. As discussed in more detail in the next section, the measurement of wholesale and retail output is related to the difference between the value of sales and the cost of goods sold. This margin covers the cost of providing the services necessary to secure a sale.

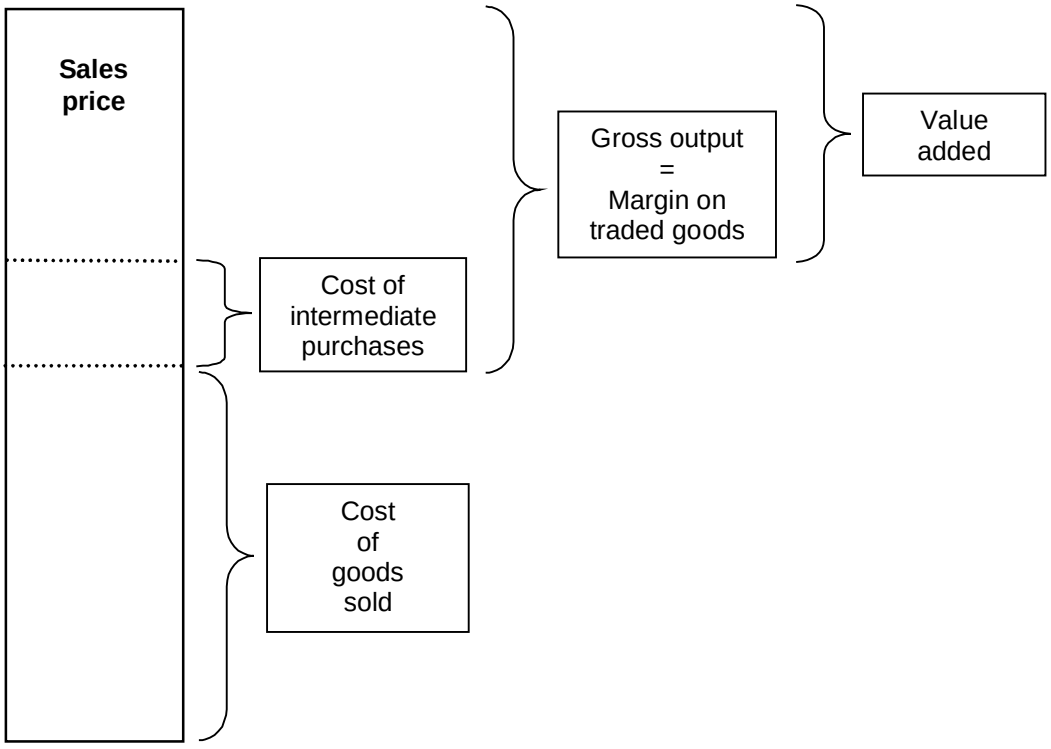
A corollary is that measured wholesale and retail output is proportional to sales. This has some important implications. First, with regards to the transfer of property rights, it assumes that the 'volume' of distribution services provided is directly proportional to the quantity of goods traded. The more goods sold the greater the volume of distribution services provided. Second, it assumes the value of a unit of

distribution service is proportional to the unit value of sales.[1] However, the value of the distribution service would only be part of the total value of sales. The next section therefore considers how information on sales and purchases may be disentangled to provide an appropriate measure of output.

Measuring output

There are several ways commonly used to measure the output of the wholesale and retail trade sectors — the 'margin on traded goods' and 'value added'. The relationship between the two is illustrated in figure B.1.

Figure B.1 **Measures of wholesale and retail trade output**



a The proportions conveyed in this figure are purely illustrative.

[1] The proportionality of service to sales will remain the same providing the quality of the service is constant.

Gross output

Gross output of wholesale and retail trade is measured as the gross margin on traded goods plus any 'non-margin' income primary to wholesale and retail activity (for example, minor repairs) earned. The gross margin on traded goods is the value of sales less the cost of goods sold. The margin is therefore the difference between the value of goods sold or otherwise used and the value of goods that would need to be purchased to replace them.[2]

To remain commercially viable in the longer term, wholesalers and retailers must cover their operating costs and the cost of goods purchased for resale. Within this constraint they can provide their particular mix of services. Because competition will determine the final market price for a particular good and, given its replacement cost, this imposes some constraint on the size of the margin all other things remaining equal. This, in turn, imposes some constraint on the total costs of providing the associated bundle of wholesale and retail services.

Notwithstanding the presence of strong competition, the same good may still have a different margin in different outlets depending on the mix of services provided in each in order to secure a sale. For example, some goods sold at convenience stores may have a higher sales price and margin than the same goods sold elsewhere. In part this reflects the higher costs incurred in providing the particular mix of time and locational convenience typically associated with this kind of retail outlet.

But the general constraint on the size of the margin means that in some cases wholesalers and retailers who want to provide more of one type of service may have to provide less of another — in order to avoid increasing their sales price and losing market share.

Value added

To calculate productivity (in the manner adopted by the Commission) a measure of the value added (or gross product) in wholesale and retail distribution services is required — that is, the value of output excluding the value of goods and services used in the provision of these services. This avoids 'double counting' the value of

[2] A strict definition of wholesale and retail output is provided by the System of National Accounts (CEC et al. 1993). According to this definition the margin output of a wholesaler or retailer is the value of sales (including sales at reduced prices) *plus* the value of other uses of goods purchased for resale *minus* the value of goods purchased for resale *plus* the value of additions to inventories of goods for resale *minus* the value of goods withdrawn from inventories of goods for resale *minus* the value of recurrent losses due to normal rates of wastage, theft or accidental damage.

output produced by other industries as part of the economic production of the wholesale and retail sectors.

The value added by the wholesale and retail sectors is the gross margin on traded goods less the cost of intermediate goods and services used up in providing wholesale and retail distribution services. Value added can also be thought of as the payments to the primary factors of production used in providing wholesale and retail services (essentially, payments to labour and capital).

Scope for measurement error

Concerns have been raised about the extent to which changes in the mix and quantity of services provided by wholesalers and retailers are reflected in measured value added output and multifactor productivity. It is sometimes said that an increase in a particular service improves the overall quality of services offered by a wholesaler or retailer but because the volume of sales made does not increase proportionately — measured output does not fully reflect the increase in service.

As noted, a competitive environment reduces the scope for measurement error to the extent that it encourages retailers to offset the cost of providing more of one type of service by providing less of another type of service.

Further, if the level of services is proportional to the costs of provision and volume of sales, changes in output are fully captured. It is growth in output that is important to productivity calculations.

Longer trading hours

As discussed in chapter 5, there have been concerns raised about the extent to which longer trading hours (and the consequent improvement in time convenience) are reflected in measured retail output and productivity. In principle, an increase in time convenience represents an increase in retail output. However, longer trading hours are more likely to bring about changes in the timing of consumer purchases rather than a significant increase in the volume of sales through retail outlets. Because current measures of retail output are based on changes in sales volumes, it is sometimes suggested that available measures of retail output do not fully take into account the additional service provided (that is, greater time convenience) because there has not been a proportionate increase in the volume of sales.

However, this view does not take into account the additional costs incurred in staying open longer (for example, the cost of employing additional units of labour). All other things equal, these costs will be reflected in an increase in the sales price

of goods and (at least in principle) in measured value added, in which case there will be no mismeasurement of output. But in practice it is unlikely to be that straightforward.

In a competitive environment, retailers may offset the additional costs of providing more of one type of service by providing less of another type of service. For example, retailers who take advantage of longer trading hours may be able to offset (to some extent) any additional labour costs incurred by placing an increased emphasis on customer self-service. Retailers may also be able to offset the additional labour costs of staying open longer by providing less customer service (for example, product information and sales assistance) by substituting lower skilled labour for higher skilled labour. For the retail sector as a whole, increased hours worked in larger retail stores could be, to some extent, offset by decreases in hours worked in smaller retail outlets (for example, the demise of the 'corner' store).

It is likely that extended trading hours were made possible, at least in part, by a reduction in other services. The net effect on measured value added is unclear but it is unlikely to be large. In this case, the change in measured output should be close to the change in 'actual' output.

Economies of scale

A further possibility is that some of the larger retailers may be able to take advantage of economies of scale to offset the additional costs of providing more of a particular service. For example, 'super stores' may be able to offer a larger product range and lower prices because they can take advantage of economies of scale (Bosworth 1998). As a result, some of the increase in output (in this example, the provision of a more extensive product range) may not be captured in measured value added. In this case, the change in output is not proportional to the change in costs (by definition).

Measuring real value added

A problem in measuring the value of output of all sectors of the economy is distinguishing price movements that reflect changes in quality from pure price changes (that is, inflation). As noted earlier, changes in quality should be included in measured output.

In practice, statistical agencies find it difficult to isolate price effects due to changes in the quality or mix of services from pure price effects. Among wholesalers and retailers there can be large variations in the mix and level of services provided in order to secure a sale. Further, in any given period, some elements of service may

be improving and other elements declining. For example, as noted earlier, in a given period there may have been an improvement in time convenience but a decline in the level of customer service provided. Ascertaining the net effect of these changes on prices is extremely difficult.

In revaluing wholesale and retail trade output from current to constant prices, the ABS uses deflators specific to the goods being traded.[3] While the construction of these deflators may standardise for some elements of service (for example, locational convenience), many aspects of service may not be standardised. Further, statistical agencies usually do not have enough information to make explicit adjustments to the deflators for changes in the provision of wholesale and retail distribution services. As a result, there is the possibility that some improvements in service may be treated as a pure price change (that is, the change in production is understated) or, alternatively (though less likely), that some of the pure price change is wrongly attributed to an improvement in service provision (that is, the change in production is overstated). However, in a competitive environment where there is substitution between services the extent to which nominal price movements reflect changes in quality is likely to be small.

B.3 Measurement in practice

The ABS methodology for estimating wholesale and retail value added has been subject to change in recent years and improvements made in recent years have not yet been documented in detail.

The measurement of wholesale and retail value added in the survey/census year

The ABS uses wholesale survey and retail census data to estimate value added for the Australian national accounts. The retail census and wholesale survey are only conducted periodically. Retail censuses were conducted in 1979-80, 1985-86 and 1991-92 and wholesale surveys were conducted in 1981-82 and 1991-92. The next wholesale survey and retail survey are scheduled for release in September 2000 and will provide data for 1998-99.

[3] The ABS is investigating the development of price indexes for wholesale and retail services.

Extrapolating the base year estimate of wholesale and retail value added

The ABS directly measures wholesale and retail value added only in the survey/census year. For other years, it uses growth in constant price estimates of wholesale sales and retail turnover to extrapolate the current price estimate of value added from the base year to obtain a constant price value added series. Sources of wholesale sales and retail turnover data are outlined in box B.1. This method assumes that wholesale and retail value added remains a fixed proportion of sales/turnover over time.

Box B.1 **Sources of wholesale sales and retail turnover data**

Sales data are collected for 6 wholesale industries — identified from the Quarterly Inventory and Sales survey. The 6 wholesale industries are: Basic materials wholesaling (ANZSIC classification 45 — excluding petroleum products); Petroleum product wholesaling; Computer wholesaling; Machinery & motor vehicle wholesaling (ANZSIC classification 46 — excluding computer wholesaling); Personal & household good wholesaling; and Public Marketing Authorities (PMAs).

Wholesale sales data are taken from the Quarterly Inventory and Sales survey.

Turnover data are collected for 18 retail industries — 16 of which are identified from the Monthly Retail Turnover survey. The 16 retail industries are: Supermarkets & grocery stores; Takeaway food retailing; Liquor retailing; Other food retailing; Department stores; Clothing retailing; Other clothing related retailing; Furniture & floor coverings retailing; Domestic hardware & hardware retailing; Domestic appliance retailing; Newsagents; Toys & game retailing; Other recreational good retailing; Pharmaceutical; Watch & jewellery retailing; and Other retailing.

The other two retail industries are Motor vehicle operations and Motor vehicle purchases. For Motor vehicle operations, estimates are derived from household final consumption expenditure figures. For Motor vehicle purchases, data are derived from motor vehicle registration figures. The motor vehicle registration data are broken down by type of vehicle. The ABS has estimates of the average value of each type of vehicle in the base year. These average values are weighted and multiplied by the number of registrations to derive an aggregated measure of turnover.

To isolate changes in volume from pure price changes, the ABS uses deflators to calculate real wholesale sales and retail turnover. To construct a price deflator for each of the industries identified above, the ABS starts with commodity price deflators. In the case of wholesale industries, it uses deflators relating to Australian-produced and imported goods. For retail industries, the ABS uses components of the CPI data.

The commodity deflators are used to form wholesale and retail industry price deflators. This is done by using the commodity structure of industry output revealed

in the 1991-92 survey/census. This provides the weights to aggregate the commodity price deflators. The constant price estimates of industry sales/turnover are aggregated using the value added weights from the 1991-92 survey/census.

Growth in constant price estimates of turnover and sales are used to extrapolate the base year current price estimates of wholesale and retail value added to obtain a constant price series.

The case of Computer wholesaling

In the case of Computer wholesaling, the ABS calculates the real value of computers (for example, to include in capital stock measures) by deflating the sales value of computers by a specially constructed price index. The particular price index used is a hedonic price index which takes account of quality improvements in computers that occur, for example, through increases in memory and processing speed.[4] The real price of computer characteristics has been declining over time, especially in the 1990s. This means that the real value of computers, measured in quality-adjusted terms, has been rising rapidly through the 1990s.

Growth in real sales is then used to extrapolate the base year estimate of Computer wholesaling value added. This procedure assumes that the wholesale margin varies with the power of the computer, so that sales of more powerful computers raises wholesaling output. The ABS is therefore growing the base year estimate of Computer wholesaling value added by a price index which reflects improvements in the characteristics of computers rather than the sale price of the computer as a 'unit'. This breaks the link between Computer wholesaling output and the difference between the sales price of a unit and the purchase price — the basic approach used for wholesaling and retailing of other goods. In reality, the wholesaling services and therefore output are much more likely to relate to the number of computer units sold, and have regard to their value of sales services rather than the computer power of the item sold.

[4] The ABS has recently revised its methodology for estimating Computer wholesaling value added. Effective from the June quarter 2000 national accounts the ABS no longer uses an hedonic price index to deflate the sales value of computers for the purposes of estimating Computer wholesaling value added. The ABS now uses current price estimates of sales by computer wholesalers as the indicator for real computer wholesale services from the September quarter 1996 onwards. This change is not reflected in the data used in this paper.

Methodological issues

The ABS methodology for measuring wholesale and retail trade value added raises a number of issues.

The ABS only collects the data necessary to directly measure wholesale and retail trade value added periodically. As a result, the ABS is forced to assume that wholesale and retail value added remains a fixed proportion of real sales and turnover respectively.

However, there are several reasons why wholesale and retail value added as a proportion of sales/turnover may have changed since 1991-92. They include changes in technology, competition, the range of merchandise carried and/or service quality. For example, if competition increased during the 1990s, this could have put pressure on wholesale and retail value added to sales ratios. If this were the case, there could be an element of overstatement of wholesale and retail value added all other things (including the extent of scale economies) equal. On the other hand, it could also be argued that the observation year 1991-92 was one in which value added to sales ratios were particularly low, because of the effects of the recession in the early 1990s (see chapter 2).

It may also be the case that since 1991-92 wholesalers and retailers have outsourced a higher proportion of the services they provide. Chapter 4 provides some examples of increased outsourcing in transportation services. All other things equal, outsourcing services would reduce a wholesaler's or retailer's value added to sales ratio. This would have the effect of overstating wholesale and retail output.

The ABS has taken steps to reduce the scope of these sources of error by benchmarking against other data sources. For years from 1994-95, it has been using supply and use tables, which reconcile production and expenditure data, to provide a more accurate measure of wholesale and retail value added.

A further complication is that, in constructing the industry price deflators, the ABS uses a mapping of commodity deflators by industry according to the 1991-92 survey/census results. This assumes that the commodity composition of industries has not changed since 1991-92. Different commodities carried by wholesalers and retailers will have different sales to value added ratios. Over the course of the 1990s, the product range of wholesalers and retailers is likely to have changed as the pattern of consumer and industrial demands have changed and wholesalers and retailers change their specialisations, add new products and so on. However, it is difficult to predict whether the failure to account for changes in product mixes would have led to an overstatement or understatement of value added in these two sectors.

In the case of Computer *wholesaling*, it arguable that the ABS should not be basing its value added to sales ratio on the real volume of computer sales taking account of quality changes in the product. The output of Computer wholesalers is the service of distributing computers. The quality of the computer units is an output of the computer manufacturing sector and not Computer wholesaling. There is no necessary reason why the distributive service provided by computer wholesalers should be growing at the same rate as a quality-adjusted measure of computer manufacturing output. Yet, the ABS measure of Computer wholesaling output is one that combines the gains in quality per machine with the increase in the number of machines sold. It could bear very little relationship to the actual activity of the computer wholesaler.

As a result, it is likely that the available estimates of the growth in Computer wholesaling value added are overstated. However, to put this in perspective, in 1989-99, Computer wholesaling gross value added accounted for only 7 per cent of total wholesaling gross value added (in constant prices).[5] Thus, it is unlikely that overestimation of productivity in computer wholesaling has had a significant impact on productivity in the wholesale sector as a whole.

On balance, it is impossible to say with precision what the net effect of the issues outlined above are on measured wholesale and retail value added. While changes in the mix and quality of services have occurred, their importance should not be overstated. There is the possibility of substitution effects that may offset (at least to some extent) the provision of more of one type of service (for example, longer trading hours). Increasing economies of scale and an increase in specialty stores may lead to value added being understated. An increase in outsourcing would lead to value added being overstated. Changes in the commodity mix carried by wholesalers and retailers could lead to value added being overstated or understated. While there are problems in accurately measuring wholesale and retail value added, some effects may be isolated to certain industries at certain times, and some effects may be 'counterbalanced' at least to some extent by opposing influences. Recent improvements in the ABS methodology have reduced the potential scope of some sources of error.

5 In chapter 4, the 1991-92 Wholesale Survey data show that, in 1991-92, Computer wholesaling gross value added accounted for 6.7 per cent of total wholesaling value added. The reason for the difference is that the ABS uses 1997-98 as the reference year. As the price of computers has fallen rapidly, when extrapolated back from 1997-98, the proportion of Computer wholesaling value added to total wholesaling value added declines. Therefore the ABS time series data show that, in 1991-92, the proportion of Computer wholesaling value added to total wholesaling value added was only around 1 per cent.

B.4 Measuring inputs

Conceptually and in practice the measurement of wholesale and retail inputs should not be any different to the measurement of inputs in other sectors of the economy. As Wolff notes in relation to service sectors in general — labour, capital and material inputs are easily identifiable and measurable and are, in principle, no different than in other industries (Wolff 1999).

The main difficulty in measuring labour and capital is ensuring that improvements (or degradation) in their quality are recorded as input growth. As Gretton & Fisher note:

> Quality improvements not captured in estimated capital and labour services are captured instead in the measures of productivity growth — growth in multifactor productivity could be upwardly biased when input quality is improving. (Gretton and Fisher 1997, p. 6)

This problem is not unique to the wholesale and retail trade sectors. It applies to all sectors of the economy.

Given there is nothing particularly unusual about the measurement of wholesale and retail inputs, this section provides only a general discussion of the measurement of labour and capital inputs.

Labour

It is standard practice to measure labour in quantity terms. For all sectors of the economy, labour input is measured in hours worked. Conceptually, hours worked is a better measure of the flow of labour services than persons employed. This is because hours worked takes into account not only changes in the number of persons employed but also changes in: overtime worked, standard weekly hours, leave taken and the proportion of part-time employees. All of these factors can affect output. However, neither employment nor hours worked data takes into account changes in the quality of the workforce (in terms of skills, education, profile, experiences etc).

Potentially, changes in the quality of labour could have a significant effect on output. However, at present the ABS does not make a separate adjustment for changes in quality (for example, changes in educational attainment). This needs to be kept in mind in interpreting productivity trends, particularly if there is evidence that the skill or education profile of a sector has changed significantly over time.

Capital

The ideal measure of capital input is the flow of capital services. However, in practice, the flow of capital services cannot be measured directly. As Gretton & Fisher note:

> The difficulty in estimating capital services derives from the fact that capital items are durable and generally used by owners. If all capital were rented, transactions in the rental markets would fix the price and quantity of capital services in each period. However, such markets do not always exist and relevant market data are not generally available to estimate the price and quantity of capital services. Hence, indirect methods have been devised for inferring these service values. (Gretton and Fisher 1997, p. 53)

The ABS has recently adopted new procedures for estimating capital services. It begins by estimating gross fixed capital formation in volume terms — most are constant price estimates, but some are chain volume estimates. For each type of capital asset, the ABS determines an age-efficiency profile covering the life of the asset. The ABS then derives a volume measure of the productive capital stock by multiplying the appropriate age-efficiency profile with the estimates of gross fixed capital formation. Finally, an index of capital services is derived using estimates of the rental prices of each asset to weight the index of the productive capital stock of each asset class.

Changes in the quality of capital should be captured as growth in capital services. The ABS does its best to take account of quality changes for all goods, but is unable to do so perfectly. This involves adjusting the price deflators used in calculating the constant price estimates of gross fixed capital formation. However, if prices growth is not fully adjusted to reflect improvements in the quality of capital, the measure of capital services would be understated.

B.5 Summing up

The appendix attempted to gauge in broad terms whether there are particular reasons to doubt the accuracy of measurement of wholesale and retail productivity. In doing this it has focused mainly on the measurement of wholesale and retail output. A number of concerns about output measurement have been considered: the extent to which changes in the mix and quality of services (for example, longer trading hours) are reflected in measured value added; the limitations of assuming that wholesale and retail value added has remained a constant proportion of sales and turnover respectively throughout the 1990s; and the measurement of Computer wholesaling value added.

It is impossible to say using the available data what the net effect of the data limitations outlined in this appendix are on measured output and productivity. Some may introduce an element of overestimation while others may introduce an element of underestimation. This is not to suggest that the effects cancel each other out and are therefore unimportant. Rather, in coming to a view about wholesale and retail productivity consideration needs to be given to the trends revealed in the available data, the potential for mismeasurement and information obtained from industry.

C Industry Snapshots

To provide insights into the productivity performance of two important wholesale and retail industries, this appendix presents a 'snapshot' of the petroleum and motor vehicle industries. It focuses on the factors which have most affected their productivity performance.

C.1 The petroleum wholesaling and retailing industry

The wholesaling and retailing of petroleum products in Australia has been characterised by ongoing change. This has involved rationalisation, changes in work arrangements, the introduction of new technologies and increased competitive pressures from the emergence of independent importers and independent retail networks.

Petroleum products represent a sizeable share of the output of the *wholesale* industry. In 1991-92, petroleum products accounted for nearly 10 per cent of total wholesale trade output. In fact, petroleum products contributed the largest share of output of any (4-digit) wholesale industry.

Petroleum retailing represents a small, but significant, share of total *retailing* output. In 1991-92, petroleum retailing accounted for 5 per cent of total retailing output. It represented around 32 per cent of motor vehicle services retailing output (ABS 8625.0).

Given the significant level of vertical integration by the major oil companies in the petroleum industry (as discussed in Chapter 2) the wholesaling and retailing of petroleum is discussed together.

The industry

The major players in the petroleum wholesaling industry are Shell, Mobil, BP and Australian Petroleum. The latter was formed in 1995 when Caltex and Ampol merged. These oil majors supply around 95 per cent of Australia's petroleum products, with the remainder supplied from imports (Roarty 1999).

Petroleum products may be marketed direct to commercial customers through retail outlets or through wholesalers. Petroleum refining, wholesaling and retailing operations are closely integrated within each company, giving rise to considerable economies of scale. Oil company data show that around 70 per cent of wholesalers were associated with the oil majors through ownership or branding (IC 1994). The Australian Petroleum Agents and Distributors Association (APADA) also noted that most major distributors now have oil company equity (industry consultation).

There are also independent wholesalers sourcing fuel from the majors or from imports. There has been an active international trade of petroleum products into and out of Australia for a number of years. There are no policy barriers to imports.

In petroleum retailing, the oil majors are involved through direct ownership, franchise arrangements and branding. In 1997, oil company-owned and franchise sites accounted for around 35 per cent of all retail outlets in Australia. Sites supplied by oil company distributors and/or marketers, but owned by distributors or individual dealers, accounted for a further 47 per cent (see table C.1). Ownership by the oil majors has been restricted by legislation. This is discussed later in this appendix.

Table C.1 **Retail outlet ownership and management, 1997**

Ownership/management	*Number*	*Per cent of total*
Company/agent operated sites	373	5
Franchised sites	2 497	30
Branded owner dealer sites	936	11
Sites supplied by oil company distributors or marketers	3 920	47
Independent chains (for example, Liberty, Gull)	479	6
Supermarkets (Woolworths)	85	1
Total	**8 290**	**100**

Source: Roarty (1999).

Demand for petroleum products is influenced by the level of economic activity. Consequently, as the demand for fuel is relatively price inelastic, demand can fluctuate according to the level of economic activity. As noted in Appendix B, productivity essentially is a measure of the relationship between output and inputs. Thus, more buoyant economic conditions can raise productivity estimates (other things being equal) through a positive effect on output.

Some of the (input-related) factors affecting productivity discussed below are related to refining. However, the integration between refiners and the wholesaling, distribution and retailing of petroleum products (see table C.1) mean that

improvements in productivity made in the refining process can flow through to the distribution and, to a lesser degree, retailing of petroleum products.

Capital and productivity enhancing arrangements

The petroleum products industry is capital intensive. It has substantial funds invested in assets used in refining, storage and distribution.

Refiners in particular have a number of arrangements in place which permit rationalisation of resources and the capacity to run existing capital more intensively. These include:

- *Refinery exchange agreements* which facilitate the sharing of refinery capacity and enable the oil majors to supply branded petrol nationwide while only having refineries in some major population centres. These refinery exchanges account for around 40 per cent of wholesale sales (ACIL 1997). These agreements, which are longstanding, allow oil companies to exploit refining economies of scale and keep transportation costs down.
- *Borrow and loan arrangements* which are used by the oil majors to cover some supply shortages. A permanent agreement occurs when a refiner has no facilities in a region and obtains ongoing drawing rights from another's facilities. A temporary agreement is where a refiner needs to borrow to cover for maintenance programs and the like. A spot agreement occurs when there are unforeseen interruptions in supply. The arrangements permit significant rationalisation of tankage and supply so that, instead of constructing additional tankage — which might be used only occasionally — a refiner borrows product from a rival producer. This involves a physical transfer, rather than a sale, for a period and pay back at a later date (including a storage fee) (ACIL 1997). These arrangements have been in place for many years.
- *Joint terminalling* which involves the sharing of terminals between oil majors. The aim is to exploit the increasing returns to scale of large terminals. In most cases, one company takes responsibility for management and operation. Joint terminalling arrangements have only been in place over the last few years.

Production has also been enhanced by significant new investment. The Australian Institute of Petroleum (AIP) considered that the 'capital spike' in the 1990s shown in ABS investment data for petroleum wholesaling (see chapter 4) was consistent with some major investment projects in that time (industry consultation). To the extent that there may have been some over-capacity after this investment 'spike', this would allow later output growth to be accommodated.

Some of the arrangements discussed above create a positive relationship between the majors' profits, especially in joint terminalling, since cost-saving actions by one firm also reduce costs for the other. This encourages further cooperation, which potentially could result in collusive behaviour. However, the IC (1994) concluded that where collaborative arrangements reduced the firms' costs, they could be of benefit to consumers.

Nevertheless, some of these cooperative arrangements are likely to breakdown in the event of a producer developing a differentiated product to increase market share (for example, Shell Optimax petrol), rather than the past situation where producers tended to produce a relatively homogeneous product which they were willing to supply to their competitors.

Rationalisation

The nature of refining-wholesaling/distribution highlights the importance of economies of scale. The arrangements discussed above serve to augment greater efficiency in the use of heavily sunk capital. Not surprisingly, rationalisation has been extensive in all sectors of the petroleum products industry over the last 20 years (IC 1994).

Concentration has increased since the early 1980s, with the number of majors decreasing from nine to four — mainly through mergers or acquisitions. Petroleum products wholesaling has suffered from the generally poor profitability associated with the oil industry as a whole. For instance, in 1970, there were around 7000 distributors, but the number had declined to 1700 by the early 1980s. By 1996, there were about 400 (see table C.2). APADA considers that it could be around 200 today (industry consultation).

Table C.2 **Rationalisation in the petroleum industry, 1980s and 1996**

	Early 1980s	*1996*
Number of refining and marketing companies	9	4
Number of distributors	1 700	400
Number of retail sites	12 000	9 000

Source: ACIL (1997).

In the process of rationalisation, many small distributorships have closed or have merged. The integration of numerous small distributors in a certain geographic area and the decision to withdraw from unprofitable regions and markets has in the main been initiated by the oil companies. APADA commented that distributors were

rationalising capital by closing depots, selling tankers and trucks and outsourcing transportation to haulage contractors (industry consultation).

By rationalising, costs can be lowered through economies in storage and tankers. Rationalisation has seen the average volumes handled by individual distribution sites increase by over 200 per cent and led to improvements in the efficiency of delivery (IC 1994; industry consultation).

The number of retail sites has also been declining since the 1970s. Service station numbers declined from around 20 000 in 1970 to around 8000 by the late 1990s. There appears to be scope for further rationalisation as it is believed that the market can only support around 5000 outlets (Roarty 1999).

This reduction in retailing outlets is not unique to Australia. In the United Kingdom, the number of retail sites declined from around 40 000 in 1968 to 16 000 in 1995 and, in Canada, the number of sites declined from 21 000 in 1991 to 14 500 in 1995 (ACIL 1997).

This reduction in retail outlets has increased sales volumes substantially and reduced retailing unit costs. Larger retail sites are able to achieve economies of scale in the sale of petroleum products and economies of scope in the sale of non-petroleum products.

Average retail sales of petroleum products per site have increased from 149 000 litres per month in the early 1980s to 267 000 litres per month in 1996. However, the Motor Trades Association of Australia (MTAA) considers that only those outlets with sales in excess of 450 000 litres per month will remain viable (ACIL 1997).

This rationalisation has been driven, in part, by technological change and is discussed below.

Technology

In the distribution of petroleum products, new technology has also resulted in efficiency gains. For example, the use of multi-point computerised bottom loading arms at terminals has reduced truck turnaround times. Also, computers on board vehicles have helped to improve management of drivers and equipment (industry consultation).

The introduction of B-double road tankers with a capacity of 70 000 litres (including dog trailer) has further fuelled efficiencies in distribution (industry consultation). This has led to a reduction in the smaller regional depots as these

large tankers are able to deliver direct to larger customers. For smaller deliveries, rather than offloading at the local depot, one trailer may be uncoupled and the other trailer used for delivering to the smaller customers.

The most significant technology introduced into petroleum retailing has been the single-operator console and associated systems to permit customer self-service in service stations. This has enabled petroleum retailing to reduce labour costs and increase output per unit of labour. While full-service is still provided at some service stations, this service now attracts a premium on the price of fuel relative to self-service fuel. The introduction of improved technology in motor vehicles has resulted in a decline in sales of traditional non-petroleum products and services for service stations. For example, more sophisticated motor vehicles has led to vehicle servicing shifting away from service stations to motor vehicle dealers and specialist repairers. The less frequent servicing required and greater reliability of modern vehicles has also shifted business from the workshops attached to service stations to motor vehicle dealers and specialist repairers.

The specialisation in the retailing of motor vehicle servicing and repairs has seen the establishment of specialist tyre centres, battery centres and exhaust systems retailers. This has shifted sales of motor vehicle parts and accessories and servicing of motor vehicles away from service stations.

Work arrangements

The petroleum products industry has seen considerable improvements in the workplace since the early 1990s. With few exceptions, enterprise or site awards are now in place (IC 1994).

The oil majors and unions agreed to move away from Federal industry-awards in favour of company or site awards well before the Australian Industrial Relations Commission established enterprise bargaining as a key principle. An agreement between the oil majors and unions was reached in October 1990 and formally reaffirmed in June 1991. It established a mix of site, company and industry awards to replace the existing system of industry awards.

The enterprise approach had been embraced by most participants in the industry. For example, APADA reported that its members had a need for enterprise bargaining to modify aspects of Federal awards which allowed ‘little flexibility in hours work or working patterns’(industry consultation). It claimed that the awards were ill-suited to the operations of independent distributors (IC 1994).

Reform of awards has been accompanied by reductions in the workforce. Employment in three oil companies (BP, Caltex and Shell) fell by 25 per cent from 1990 to 1993. At the end of 1996, the refining and marketers directly employed around 8000 people (ACIL 1997).

Out-sourcing has also been an important change. AIP said that maintenance work at refineries is now outsourced. Shell operate their own tankers, while other oil companies use a mix of their own tankers and contract transport companies (industry consultation).

Competition and regulation

A significant development in the petroleum industry has been the growth in independent operators in both the wholesale and retail sectors. This growth in competition has been driven in part by changes to regulatory arrangements.

Wholesaling and distribution

At the refiner-marketer level, the barriers against a fully integrated competitor entering into the market are high due to the large economies of scale involved in refining. There is a high minimum efficient scale, implying a requirement for large sunk costs. There have also been substantial natural barriers to imports, due to economies of scale in importing, storing and distributing product, coupled with a lack of access to terminal facilities.

Recently, however, the scope for an importer-marketer to enter the market has been broadened. The most significant development has been the opening of several terminals which were freed by the enforceable undertakings given to the Australian Consumer and Competition Commission (ACCC) after the Ampol-Caltex merger. The undertakings lowered entry barriers by improving access to terminals. In addition, the undertakings involved the divestment of surplus terminals (and included the sale of distribution and retail sites).

Further competition has come from the establishment of independent terminal facilities to handle imported petroleum. These terminal operators have the international experience, connections, financial resources and facilities large enough to handle efficient sized shipments of imported fuels (Petroleum Gazette 1997).

Prior to the ACCC undertakings, Coogee Chemicals constructed a petroleum storage in Perth. Wicklands Corporation commissioned an independent terminal in Hastings, Victoria in 1996 and Van Ommeren, a Dutch company, in Sydney in the same year. Van Ommeren has since purchased the Wicklands facility and is

planning to expand its storage capacity in Australia. The locations and capacity of the independent import terminals is provided in table C.3.

Table C.3 **Independent import terminals**

Operator	*Tank capacity*	*Maximum import cargo size*	*Capital cost*
	million litres	million litres	$ million
Van Ommeren Port Botany New South Wales	100 (76 available for petrol)	80 (30 is normal)	28
Van Ommeren Hastings Point Victoria	70 (60 available for petrol)	30	18
Gull Kwinana Western Australia	58 (53 available for petrol)	30	np
Fletcher Challenge Brisbane Queensland	43 (13 available for petrol)	15	np

np: not provided

Source: DISR (1999a).

The entry of Woolworths into the retail market and the growth in the number of independent network retail outlets such as Liberty, Gull and Burmah has been a result of changes that have occurred in the wholesaling of petroleum. The enforceable undertakings given to the ACCC from the Ampol-Caltex merger lowered entry barriers by improving access to terminals. In addition, the establishment of large scale independent terminal operations to handle imported petroleum has enabled independent distributors and wholesalers an alternative source of supply from the major oil companies. This provided the opportunity for Woolworths and other independents to enter the market and gain access to product from either imports or from the oil company terminals.

Retailing

The response of the established players in the retailing sector, particularly the oil companies, to the introduction of new competition and the loss of traditional non-petroleum sales revenue has been to shift to the sale of convenience store products. With increased competition lowering margins on petroleum product sales, particularly in metropolitan areas, many retailing outlets have been required to increase their non-fuel sales from food and convenience products to remain viable.

Shop sales from petroleum retail outlets have surpassed workshop related sales and, in a number of large metropolitan retail establishments, total non-fuel sales exceed fuel sales (Roarty 1999; ACIL 1997). Sales from convenience products in Caltex service stations, with convenience stores attached, now account for 55 per cent of total sales, compared to fuels sales of 45 per cent. (Sydney Morning Herald, 6 June 2000). To some degree, service stations are now competing with the 'corner store' convenience retailer.

The introduction of Woolworths, the significance of non-petroleum sales for petroleum retailers and initiatives by the major oil companies to develop convenience stores has seen a trend towards combining petroleum retailing with food, convenience and more recently grocery retailing. For example, Caltex is moving from convenience stores attached to its service stations to establish full size supermarkets in its forecourts in conjunction with the IGA supermarket chain (Roarty 1999).

The independent retailers and Woolworths, unlike the oil companies, are not subject to the regulatory requirements of the Franchise and Sites Acts.

The *Petroleum Retail Marketing Sites Act 1980* was introduced by the Commonwealth Government to address unfair competition from the oil companies against owner/dealer operated retail sites by limiting the number of sites through a quota that could be owned and operated by the oil majors. The number of sites actually operated by the oil majors is often less than their quota. For example, in 1996, the quota was 424 sites, but only 373 sites were operated by the oil majors.

The *Petroleum Retail Marketing Franchise Act 1980* sets minimum conditions for retail franchise arrangements. These conditions cover duration of the franchise, the right to assign the franchise, increases in payments by the franchisee and prohibitions on price discrimination across branded franchises.

The Commonwealth Government intended to repeal these acts and introduce an Oil Code to address the concerns of franchisees in their relations with the oil companies. However, in September 1999, the Government announced it would not be proceeding with the repeal of the legislation as agreement could not be reached between all stakeholders (Roarty 1999; AIP industry consultation).

The *Petroleum Retail Marketing Sites Act 1980* is seen by the oil companies as limiting their ability to realise efficiencies from vertical integration at the retail level, thereby restricting their marketing options on how to retail their products. The duration of tenure required under the *Petroleum Retail Marketing Franchise Act 1980* limits the oil companies responses to changes in market conditions such as changing its site or marketing arrangements (ACIL 1997).

The MTAA, representing the service station franchisees, claims that the repeal of the legislation could increase the power of the oil majors (Roarty 1999).

Summary

As the wholesaling and distribution of petroleum products is capital intensive, productivity has been driven by the need to rationalise capital and operate remaining capital more intensively. To this end, there have been exits from the industry and mergers which have led to:

- a rationalisation of capital;
- increased capacity to take advantage of economies of scale; and
- the retirement of less productive capital.

Other factors affecting the productivity performance of the petroleum wholesaling sector include:

- workplace reforms which have led to greater use of enterprise agreements;
- straighter line distribution (that is avoidance of double handling though more direct drop-offs rather than via depots);
- distributors rationalising capital by closing depots and outsourcing transport; and
- greater competition from independent terminal operators and wholesalers.

In petroleum retailing, productivity has been driven by the need to maximise the amount of petrol sales through the site, which also provides the opportunity to increase the sales of other goods, often with larger margins attached. To achieve this, there has been:

- rationalisation of service stations (with particular pressure placed on smaller sites) to increase petroleum sales per site; and
- diversification via an increase in 'convenience' retailing as an adjunct to petroleum retailing.

Other factors affecting productivity in petroleum retailing include:

- the introduction of single operator console controlled self-service stations which has increased labour productivity; and
- the increase in competitive pressure from the growth in the number of independent chain outlets and the introduction of Woolworths into petroleum retailing.

C.2 Motor vehicle wholesaling and retailing

The key trends in the productivity performance of the wholesale and retail sectors are discussed in chapters 4 and 5. One of the trends highlighted is the improvement in the productivity performance in both the motor vehicle wholesaling and retailing sectors in the 1990s in comparison to their performance during the 1980s.

The improvements in the productivity performance in the wholesaling of motor vehicles appears to strongly reflect increased output. It has also been driven by changes in technology and, to a lesser extent, in workplace arrangements. In the retailing of motor vehicles, output growth has been important and productivity performance has been underpinned by ongoing rationalisation and the introduction of increased competition resulting from changes in the regulatory arrangements surrounding the import of motor vehicles. Given the strong linkages between the wholesaling and retailing sectors, improvements in the productivity performance in the wholesaling of motor vehicles — such as in the distribution of vehicles from manufacturers and importers to retailers — provide benefits to the retailers of motor vehicles.

The industry

The wholesaling of motor vehicles is primarily concerned with the distribution of vehicles from the manufacturing plant (in the case of domestically produced vehicles) and from the dock (for imports) to the retailer. The distribution of domestically produced vehicle is undertaken by manufacturers, while the distribution of the imported vehicles is undertaken by the manufacturers and independent entities. For example, Inchape Motors Australia imports and distributes Subaru, Peugeot, Volkswagon and Jaguar vehicles in Australia.

The motor vehicle manufacturers and importers also wholesale and distribute parts and accessories for their vehicles. In addition to the commercial need to provide replacement parts for their vehicles, the *Trade Practices Act 1974* requires parts and services to be available for a reasonable period of time in order to maintain vehicles in operating condition (IC 1995).

Motor vehicle retailing is conducted by franchised dealers selling one or more manufacturer's vehicles. For example, a dealer may exclusively sell General Motors' vehicles while another may sell Mitsubishi and Mazda vehicles from the same location.

In 1991-92, motor vehicle wholesaling, which includes passenger vehicles, commercial vehicles and parts, represented around 10 per cent of total wholesaling

output. The wholesaling of passenger vehicles accounted for 30 per cent and parts accounted for nearly 50 per cent of motor vehicle wholesaling output (table 4.1).

In 1991-92, motor vehicle retailing, represented around 10 per cent of total retailing output. Passenger motor vehicle retailing accounted for over 90 per cent of motor vehicle retailing, with motor cycle and caravan and trailer retailing accounting for the remainder (table 5.1).

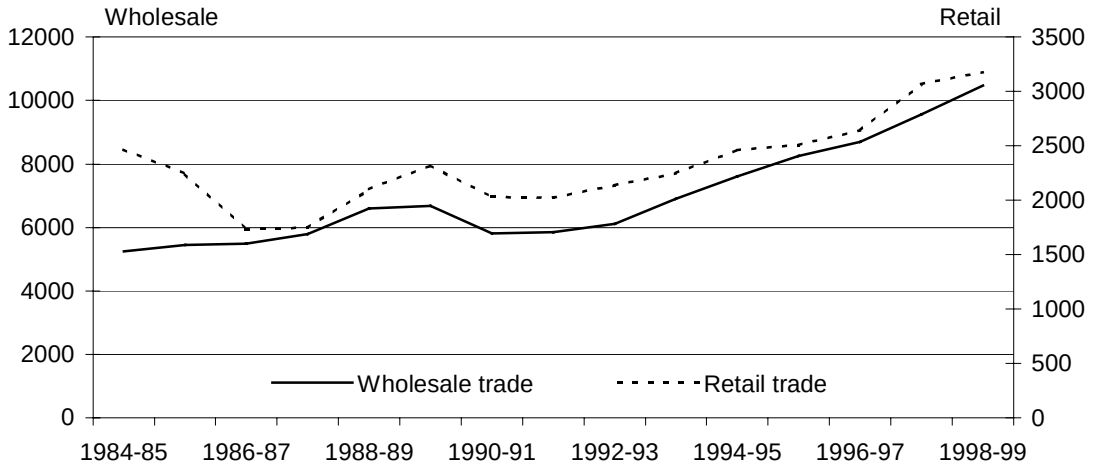
Output in the sector

The demand for motor vehicles is closely linked to general economic conditions. The growth in motor vehicle retailing and wholesale output reflects this. The downturn and the following increase in output in the early 1990s reflects the recession of the early 1990s and the subsequent recovery (see figure C.1).

Economic factors, such as the level of interest rates and the exchange rate, affect the affordability of motor vehicles. The interest rate on the financing of a motor vehicle often influences a consumer's ability and decision to finance the purchase of a new motor vehicle. The exchange rate, as reflected in the relative value of the Australian dollar against the Japanese Yen and the currency of other major motor vehicle exporters, influences the demand for imported vehicles.

Figure C.1 **Machinery and motor vehicle wholesale output and motor vehicle retail output, 1984-85 to 1998-99[a]**

$million, 1997-98 prices



a Chain volume measure.

Data source: Estimates based on unpublished ABS data.

During the industry consultations, it was commonly noted that Australia has such a competitive environment that retail margins for motor vehicles are very low by world standards. Margins and retained earnings by dealerships have been put under added pressure since the early 1990s with the introduction of the 'drive away - no more to pay' Korean vehicles (industry consultation).

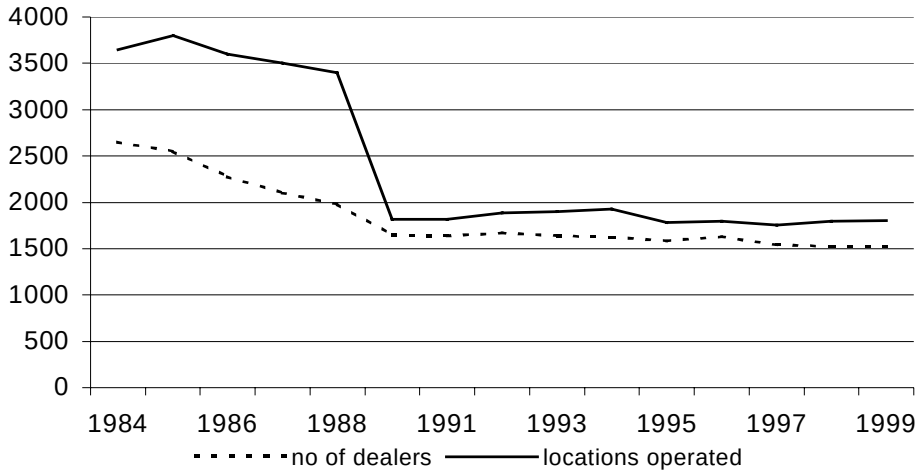
Given that dealers' input (vehicle) prices are set by their suppliers and margins are small, there is pressure on dealers to increase the volume of sales to remain viable. In addition, as vehicle manufacturers and importers want to sell more vehicles — there are large fixed costs in manufacturing motor vehicles and profits are linked to the volume of vehicle sales — there is often supplier pressure on dealers to meet annual sales targets or face loss of supply. Consequently, there has been ongoing pressure on dealer numbers.

Rationalisation

The number of dealers and the number of outlets has been declining. In 1984, there were around 2650 dealers operating from 3650 locations. This declined to around 1500 dealers operating out of 1800 locations by 1999 (see figure C.2). The largest decline in dealer numbers and in the number of locations used to retail motor vehicles occurred in the late 1980s.

Motor traders see the rationalisation of dealers and outlets as a response to the need to increase sales per outlet to meet supplier targets and maintain viability of the dealership.

Figure C.2 **Motor vehicle dealers and locations operated, 1984 to 1999**



Data source: Information supplied by MTAA.

While the number of dealerships and locations has declined, the number of new passenger motor vehicle registrations has increased. (The fall in vehicle registrations in the early 1990s reflects the economic downturn of that time.) Consequently, the volume of vehicles sold per dealer and location has increased.

Figure C.3 **New passenger motor vehicle registrations, 1986-97 to 1998-99**

Data sources: ABS 1301.0 and 9301.0.

The increase in sales volumes per dealer and per location is likely to continue. Vehicle manufactures and importers are moving towards amalgamation of their dealer networks. Selected dealers are being encouraged to amalgamate into large outlets capable of providing large scale showrooms and displays, leaving smaller service style outlets remaining as satellite centres to meet servicing requirements (Tuckey 1999; Mellor 2000; industry consultation). As land is expensive in inner city locations, the use of dealerships in these inner city locations is an inefficient means of storing vehicles. This move to large scale retail outlets will assist in reducing distribution and retail costs, which account for more than 20 per cent of the retail price of the vehicle (Tuckey 1999).

Work arrangements

In the wholesaling of motor vehicles, importers have benefited from increased flexibility in work arrangements brought about by enterprise bargaining. For example, shift arrangements are now better suited to meeting shipping and delivery times which increases throughput and enables capital equipment to be used more intensively. Also, changes in work arrangements on the waterfront have provided benefits to importers, such as enabling access to the wharf on a 24 hour basis.

Other procedures, such as badging and fitting certain components including seatbelts on imported vehicles, which were previously carried out by the distributors on their premises are now mainly carried out on the production line (industry consultation).

Motor vehicle retailing has always involved highly flexible working arrangements. The sector has been dominated by franchised small businesses, often based on family interests. Levels of unionisation are very low and remuneration has been based on commission rather than awards (industry consultation).

Given the commission based pay structures and the pressure on dealerships to increase sales, the hours worked in this sector are based on the effort required by the sales staff to 'close the sale'. While the deregulation of trading hours in the 1980s enabled dealerships to increase weekend trading hours, sales staff have generally worked outside normal trading hours to sell a vehicle.

Technology

Efficiencies in the retailing of motor vehicles have flowed from the improved use of technology in the distribution of motor vehicles from the manufacturer/importer to the dealer. Traditionally, the retailing of motor vehicles has involved the manufacturer or importer providing the dealer with vehicles they believed could be readily sold. The dealer then attempted to find buyers for those vehicles as soon as possible to ensure the dealership was not left with a large inventory of vehicles (Mellor 2000).

The introduction of computerised logistics and improved warehousing arrangements has improved the supply chain to dealers. For example, this has enabled distributors to use the same size facility, but handle an increased number of vehicles. This has assisted in lowering stock levels at the dealership and moving vehicles to the dealer to more closely match consumer demand. The ideal scenario for the dealer is to have the customer convinced that the vehicle they have just ordered will not only have room made for it on the production line to meet the special requirements as ordered, but will still arrive promptly from the production line to the dealer.

While technology has lowered vehicle inventory levels, in the case of parts, the need to hold stock for each model for a number years, both for commercial and legislative reasons, and Australia's relatively old vehicle fleet has created large stock holdings. For example, the local vehicle manufacturers, Ford, GMH, Toyota and Mitsubishi carry approximately 550 000 replacement part lines (IC 1995). Importers are also required to hold large stocks of parts for similar legislative and

commercial reasons, as well as the large leads times necessary to sea freight parts to Australia.

However, increased efficiencies in the distribution of parts have resulted from:

- the use of centralised parts distribution centres (for example, Hyundai uses a Sydney warehouse for the eastern seaboard and a Perth warehouse for the other states);
- computerised stock control;
- automated picking systems (although body panels are generally still picked manually); and
- better transport arrangements.

The use of the Internet to sell vehicles is yet to become a feature of motor vehicle retailing in Australia. However, the Internet is being used as a searchtool, particularly in the second hand market.

There may be scope for the use of information technology as a marketing tool in the retailing of motor vehicles. In the United States, dealers have developed customer data bases using software systems that profile a customer's occupation, hobbies, birthday and family members. For example, the database will enable the dealer to know that a family that has previously purchased two vehicles from the dealer has a son or daughter about to turn 17 which will create another driver in the family and possibly the need for an additional vehicle (Tuckey 1999).

Competition and regulation

The level of competition has been intense in recent years. Competitive pressures have resulted from the introduction of the small Korean imported sedan. As a result, the relative share of small cars in the passenger motor vehicle market increased from 27 per cent in 1988 to 37 per cent in 1996. Within the small vehicle segment, the share of imports increased from 22 per cent in 1990 to 88 per cent in 1998 (see table C.4) (IC 1997b; DISR 1999b).

However, market share in Australia continues to be dominated by upper medium sized cars (for example, Falcon and Commodore) accounting for around 40 per cent of sales. Fleet buyers account for 75 per cent of sales of the upper medium sized vehicles, which are nearly all locally produced. In contrast, most small vehicles are imported and sold to private buyers (IC 1997b).

Most private buyers of upper medium sized vehicles purchase these vehicles in the second hand market. However, in price terms, these second hand upper medium sized vehicles compete directly with the small vehicles.

Consequently, the introduction of small imported vehicles marketed on a 'drive a way, no more to pay' basis has also increased competitive pressures in the second hand market for larger vehicles.

The increase in competitive pressures are a result of changes in regulatory arrangements. Quotas on imported vehicles were abolished in 1988 and the tariff on passenger motor vehicles declined during the 1990s. Tariffs on imported passenger motor vehicles have declined from 40 per cent in 1990 to 15 per cent in 2000. Further reductions in tariffs are due on 1 January 2005 when the tariff on imported passenger vehicles will be reduced to 10 per cent (PC 2000).

These changes have seen imported vehicles increase their share of the new vehicle market. Imported vehicles accounted for 25 per cent of the new passenger motor vehicle market in 1990, increasing to 53 per cent in 1998 (see table C.4). This increase has been accompanied by a greater diversity in makes and models of vehicles available to consumers. For example, the number of models available for consumers increased from around 69 in 1988 to 101 in 1995 (IC 1997b).

Table C.4 **Imported passenger motor vehicles share of the new passenger motor vehicle market by segment, 1990 to 1998**

Per cent

Sector	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*
Micro/light	100	100	100	100	100	100	100	100	100
Small	22	33	40	54	74	76	83	87	88
Medium	21	23	28	24	17	28	35	48	46
Upper medium	0	0	0	0	2	1	1	1	1
Luxury/people movers	80	84	85	86	84	75	83	86	88
Total PMV market	**25**	**31**	**36**	**37**	**38**	**44**	**46**	**53**	**53**

Source: DISR (1999b).

Summary

The improvement in the productivity in the motor vehicle retailing sector during the 1990s has been driven by:

- an increase in the sales of new motor vehicles reflecting ongoing economic growth; and
- a rationalisation in dealerships and locations.

As a result, there has been an increase in the throughput of vehicles per dealer and location.

Other factors influencing productivity include the changes in regulatory arrangements from:

- the removal of import quotas; and
- the reduction in tariffs.

This has resulted in increased competitive pressures from small imported vehicles. The increase in competition has placed pressure on dealers' margins and on wholesalers (motor vehicle manufacturers and wholesalers) to reduce costs in the supply chain.

Improvements in motor vehicle wholesaling productivity are a result of the strong growth in output as well as improvements made in the supply chain to reduce costs. These include:

- increased use of technology through the introduction of computerised logistics, and improved wharehousing arrangements;
- the use of straighter line distribution; and
- greater flexibility in work arrangements.

D Industry consultation

Wide-ranging informal discussions were held with organisations, companies and individuals with a view to:

- gaining a broad understanding of general developments which have taken place in Australia's wholesale and retail trade sectors over the last twenty years;
- identifying developments which have had sector-specific impacts and ascertaining how these impacts might affect the Commission's productivity estimates; and
- testing the veracity of the productivity estimates as they relate to particular industry sectors.

Those with whom discussions were held are listed below.

Academics

Peter Gilmour, Professor of Management, Macquarie Graduate School of Management, Macquarie University.

G. Peter Dapiran, Senior Lecturer, Department of Marketing, Faculty of Business and Economics, Monash University.

Business

Coles Myer Ltd

- Chris Mara, Adviser, Government Affairs
- Ted Moore, General Manager, Regulatory Affairs

Fujitsu Australia Limited

- Christos Cockinos, Supply and Distribution Manager

Hewlett-Packard Australia Limited

- Bernie Tallis, Asia Pacific CPO Sales Administration Manager
- Andy Jaeger, Wholesale Account Manager, Commercial Channels Organisation
- Matt Campbell, Wholesale Account Manager

Hyundai Automotive Distributors Australia

- Doug Croker, Managing Director

IBM Australia

- Steven Braim, Canberra Office

Inchcape Motors Australia Limited

- John Kitchener, Strategic Development Manager
- Brian Harris, National Vehicles Operation Manager

Government

Australian Bureau of Statistics

- Charles Aspden, National Accounts Branch
- Paul Curran, National Accounts Branch
- Leon Ting, National Accounts Branch

Industry Associations

Australian Booksellers Association Inc

- Kathleen Mapperson, Executive Director

Australian Centre for Retail Studies

- Louise Carrigan, Research Assistant

Australian Institute of Petroleum

- Jim Starkey, Executive Director

Australian Petroleum Agents and Distributors Association

- Garth Symington, General Manager

Australian Retailers Association

- Stan Moore, Director, Retail Operations

Australian Supermarket Institute

- Ken Henrick, Assistant Director

Council of Small Business Organisations of Australia

- Rob Bastian, Chief Executive

EAN (European Article Numbering) Australia

- Jan Bowman, Corporate Services Co-ordinator

Hardware Association of Victoria Inc

- Richard Brooks, Secretary

Motor Trades Association of Australia

- Michael Delaney, Executive Director
- Geoff Gardner, Deputy Director
- Sue Scanlon, Executive Officer

Timber Merchants Association

- Richard Brooks, Executive Director

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