ISBN 0 642 26866 5

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Forming the Productivity Commission

The Industry Commission, the former Bureau of Industry Economics and the Economic Planning Advisory Commission have amalgamated on an administrative basis to prepare for the formation of the Productivity Commission. Legislation formally establishing the new Commission is before Parliament.

Acknowledgments

This report was researched and written by Natalia Nunes, Stephen Farago and Johanna Travis. Shaun Larcom also provided valuable assistance. Dr Don Gunasekera, Assistant Commissioner of the Economic and Environmental Studies Branch of the Commission, supervised the project. The Commission's internal referees, Dr Susan Richardson and Simon Corden, and Dr Christopher Findlay from the University of Adelaide provided helpful comments on a draft of the report. Comments from Dr Keith McLaren from Monash University are also gratefully acknowledged.

The Commission also wishes to thank officers from the International Relations Branch of the Aviation Policy Division at the Department of Transport and Regional Development for their assistance throughout the project. Officers from the Bureau of Transport and Communications Economics also provided helpful comments and suggestions in the early stages of the project.

May 1997

Contents

		Page
Acknowledgments		**iii**
Abbreviations		**viii**
Glossary		**ix**
Summary		**xiii**
1	**Introduction**	**1**
1.1	The structure of the report	2
2	**Recent trends in airline alliances**	**5**
2.1	The nature of airline alliances	5
2.2	Growth in alliance activity	8
2.3	Alliances in the Asia-Pacific region	10
2.4	Regulation of airline alliances	11
3	**Economics of international airlines**	**15**
3.1	Supply side factors	15
3.2	Demand side factors	19
3.3	Other key factors affecting competition	22
4	**Airline alliances and market power concerns**	**31**
4.1	Barriers to entry	31
4.2	The nature of competition	32
4.3	The features of the alliance	36
4.4	Potential overlap in applying competition policy	38

5 Impact of airline alliances 41

5.1 Empirical evidence of the impact of alliances 41

5.2 A quantitative analysis of code sharing on Australian international routes 48

6 Concluding remarks 57

6.1 Areas for further research 60

Appendices

A Alliances operated by Australian carriers 61

B Fifth and sixth freedom carriers 63

C A summary of recent empirical studies 67

D Model specification and estimation methodology 71

E City-pair routes used in the quantitative analysis 73

F Data and derivation of variables 75

G Detailed results of quantitative analysis 81

References 85

Tables

2.1 Number of alliances, 1994–1996 8

2.2 Survival rates for international alliances, 1992–1995 9

3.1 Structure of airline operating costs 16

5.1 Impact of alliances on revenue 43

5.2 Impact of alliances on traffic 45

5.3 Summary of endogenous and exogenous variables 51
5.4 Summary of results 54
A.1 Alliances between Qantas and other airlines 61
A.2 Alliances between Ansett International and other airlines 62
C.1 Recent empirical studies of the effect of airline market structure on pricing 68
G.1 Descriptive statistics 81
G.2 Reduced form regression results 83

Boxes

2.1 The KLM/Northwest alliance 7
2.2 Authorisation of Qantas/British Airways Joint Services Agreement 13
B.1 Freedoms of the air 63

Figures

3.1 Traffic carried compared with negotiated entitlements, 1980–1996 (millions), Australia 25

Abbreviations

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ASA	Air Service Agreements
BCG	Boston Consulting Group
BTCE	Bureau of Transport and Communications Economics
CRS	Computer Reservation Systems
DTRD	Department of Transport and Regional Development
FFP	Frequent Flier Program
GAO	(United States) General Accounting Office
GDP	Gross Domestic Product
IASC	International Air Services Commission
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IMF	International Monetary Fund
OLS	Ordinary Least Squares
TPC	Trade Practices Commission

Glossary

Air service agreements	Agreements negotiated between governments which establish the nature of arrangements for scheduled international air services to and from particular countries (also referred to as bilateral agreements).
Airport infrastructure	Air traffic control facilities, take-off and landing slots and terminals.
Alliance	An agreement between airlines to cooperate in the provision or operation of some of their services on a route, regional or global basis.
Barriers to entry	Legal, institutional and/or economic factors that limit the ability of potential and existing airlines from commencing new services on routes which they do not currently operate, or from expanding the frequency of services.
Beyond rights	The right of a carrier from one country to fly to another country and then beyond to a third country (also known as fifth freedom rights).
Blocked space agreement	Where one carrier purchases a block of seats from another carrier and resells them directly to passengers.
City-pair	An air route between two cities.
Code sharing	Where one airline assigns its airline designator code to a flight operated by another airline.
Complementary code sharing	Where two airlines code share on different but connecting routes, usually to feed traffic between two sectors.
Computer reservation system	A computerised system which provides information to subscribers (usually travel agents) on airline schedules, fares and seat availability. It is used to make reservations and issue tickets for passengers.
Economies of	Average unit costs fall as the network or number of routes

network size	increases.
Economies of traffic density	Average unit costs fall as the number of passengers travelling increases.
Equity holding arrangements	Involves the part ownership of one airline by another.
Fifth freedom carriers	An airline which is able to carry traffic between two foreign countries, conditional upon the agreement of the third country.
Freedoms of the air	A basic system of air service rights which provide the backbone for negotiating capacity rights between countries under each ASA.
Frequent flier program	An incentive program designed to attract customer loyalty by offering free flights and other benefits to passengers who have accumulated points on the basis of distance (and number of trips) flown on the airline.
Grandfathering	The process of allocating landing and take off slots at international airports which allows airlines which previously operated a slot to automatically get it again.
Hub and spoke system	A network of routes operating through a central hub point. Airlines may channel and increase traffic through hub points thereby creating economies of traffic density.
Interline agreements	Agreements between airlines which involve the coordination of, for example, baggage checks, carriage or air cargo and honouring of tickets between airlines. Under interline agreements, the carriers maintain their own identity.
Joint marketing	Joint pricing and selling of airline capacity.
Landing and take-off slots	The right to land and/or take-off from an airport at a specified time.
Multiple designation	The policy of permitting more than one airline to operate scheduled international air services between its country and other destinations.

Non-scheduled flights/services	Flights or services operated on a charter or private basis. The capacity of non-scheduled services are not covered by air service agreements.
Open skies agreement	The removal of restrictions on the ability of airlines to operate services between two countries.
Parallel code sharing	Where two airlines code share services on the same route alongside or in place of their own services.
Revenue pooling	Where airlines agree to share all revenue on a route or sector irrespective of the amount of capacity that each individual airline offers on the route.
Scheduled flights/services	Flights included as part of capacity entitlements in air service agreements and listed in a published timetable, or so regular and frequent as to constitute a recognisably systematic series, and performed for remuneration.
Single designation	The policy of permitting only one airline to operate scheduled international air services between its country and other destinations.
Sixth freedom carriers	An airline which is able to carry traffic between two countries via its own country.
Wet lease	Where one airline leases an aircraft and its crew from another carrier, as distinct from a dry lease where an airline leases an aircraft from another carrier, but supplies its own operating crew.

Summary

Alliances have become an increasingly common feature of the international airline industry.

Alliances between international airlines for the provision of airline services have grown dramatically in recent years, both in Australia and overseas. In 1996 there were almost 390 alliances in operation worldwide compared to around 280 in 1994. In Australia, both Qantas and Ansett operate alliances with a number of different international carriers.

They may take several forms...

Alliances may include coordination of flight scheduling, baggage handling, catering, ground services, maintenance, frequent flier programs and airport lounges. Sometimes, alliances include equity holding arrangements which may further strengthen the partnership between the airlines. Increasingly, airlines have sought to engage in the practice of code sharing whereby one airline sells seats on a flight operated by another airline. In some case, alliances have extended to joint pricing and selling of capacity.

...and vary in their extent of coordination and geographical coverage.

Alliances may be route-specific, involving the coordination of activities or flights between specific city-pairs. More complex alliances have sought to closely coordinate cost sharing and marketing initiatives over a larger geographical area such as between countries or regions. In some cases, the networks of international carriers have been so closely interlinked as to provide the appearance of a seemingly global network.

Alliances have emerged in response to a number of features of the aviation industry.

Low profitability in the airline industry has placed increasing pressure on airlines to control and reduce their costs. Alliances have represented one way for airlines to achieve these objectives. In addition, alliances have provided airlines with a means of overcoming to some extent the restrictions on foreign ownership and capacity under bilateral air service agreements (ASAs) and limited access to airport infrastructure in some markets.

Alliances can potentially lower operating costs,...

Alliances can potentially reduce the variable and fixed costs of servicing particular routes and the indirect costs associated with operating the airline business. Unit costs may also fall as a result of economies associated with greater traffic density.

...improve convenience and service quality for passengers,...

The convenience and quality of airline services are important features for many passengers. Alliances can produce benefits for passengers either through greater convenience and service quality, and potentially via lower fares.

...and help stimulate demand for air travel and benefit other areas of the economy.

Where these benefits are achieved, alliances may stimulate greater demand for air travel, provide a boost to travel-related goods and services and contribute to increased competitiveness of other industries.

Whilst there is evidence that participating airlines have benefited from alliances, gains to passengers are less clear.

The realisation of these potential gains relies upon airlines passing on the benefits of their alliances to passengers. The extent to which any benefits are achieved and passed on to passengers will depend upon the level of competition in the market and the potential for individual airlines to exercise their market power through alliances.

There is evidence that alliances have enabled partner airlines to increase traffic and revenues and lower their costs of providing services. However, the traffic and revenue gains appear to have been mainly at the expense of other carriers. Evidence of the benefits to passengers in terms of reduced fares and increased convenience and service quality are less clear. Whilst it is widely acknowledged that benefits to passengers can arise, there has been little attempt to quantify them.

The Commission's analysis indicates that on Australian international air routes, published economy fares are on average lower where alliances involve code sharing.

Quantitative analysis undertaken by the Commission indicates that on Australian international air routes, the standard economy fare is estimated to be about $200 lower when code sharing is present on a route. This translates to an average saving to passengers of 10 per cent on air routes. Fares also tend to be lower where there are a higher proportion of code shared seats on a route. This suggests that passengers have benefited from code sharing to some extent through lower fares.

The potential for airlines to exercise market power through alliances makes them subject to scrutiny by regulators.

In most countries, airline alliances are subject to anti-trust or trade practices legislation. This is also true in Australia, where alliances may require the approval of the Australian Competition and Consumer Commission (ACCC) if they result, or are likely to result, in a substantial lessening of competition. In addition, Australian international carriers proposing to operate services on a code share or joint basis must satisfy the International Air Services Commission (IASC) that it is in the public interest.

Market power concerns about alliances will depend on the nature of the market and the alliance itself.

Concerns about the potential market power available to airlines through alliances will be greatest when barriers to entry exist; the partners together account for a significant market share; competition from other airlines on alternative routes is limited; and where alliances restrict the ability of the partner airlines to operate independently.

In some cases, restrictions imposed on the ability of airlines to engage in airline alliances may reduce the scope for airlines to achieve greater efficiency through closer cooperation, without necessarily reducing any market power available to the airlines. This does not mean that airlines should be able to enter into alliances without demonstrating the public benefit of such arrangements. Instead, attention should be directed to whether the operation of the alliance will provide greater opportunities for the airlines to exercise their market power.

Further research on international airline alliances and the airline industry more generally is warranted.

The report identifies several areas for further research. There is a need for better data in order to thoroughly assess the impact of airline alliances, particularly over time. A more thorough understanding of the impact of alliances may also enable a better evaluation of the effectiveness of existing regulation in targeting abuses of market power. The scope for addressing regulatory restrictions created by ASAs and access to airport infrastructure also warrants further investigation.

1 INTRODUCTION

Alliances between international airlines for the provision of airline services have become an increasingly common feature of the airline industry. In 1996 there were an estimated 389 alliances in operation worldwide compared to around 280 in 1994 (Gallacher 1996). In Australia, both Qantas and Ansett International operate alliances with a number of different international carriers.

The term 'alliance' refers to an agreement between airlines to cooperate in the provision or operation of some of their airline services. Alliances between airlines differ markedly. For example, they can incorporate arrangements such as coordination of frequent flier programs, flight scheduling, baggage handling, catering, ground services, airport lounges, maintenance and in some cases, joint selling of seats and fare determination. Many alliances allow for code sharing whereby an airline is able to sell seats on its partner's airline rather than serve those destinations directly. Sometimes, alliances include equity holding arrangements which may further strengthen the partnership between the airlines.

Alliances may be route-specific, involving the coordination of activities or flights between specific city pairs, or be on a country or regional basis. In some cases, airlines have sought to cooperate in the provision of air services involving a large number of routes so as to strategically link their flight networks and provide globally interconnected services. Key examples are the alliances between KLM/Northwest, British Airways/Qantas/USAir and United Airlines/Lufthansa.

There are a number of reasons why airlines may have an incentive to operate jointly through international alliances, for example:

- to increase their efficiency by improving their capacity utilisation or reducing their costs of operation;
- to enhance the marketability of their services to passengers by offering greater convenience, a larger network and greater frequency of flights;
- to overcome regulatory constraints on the ability of individual airlines to participate in a market such as capacity restrictions in air service agreements, restrictions on ownership and equity holding across national borders, and restricted access to airport infrastructure; and
- to enhance their ability to exercise market power.

The potential for airlines to exert market power justifies regulatory intervention. In most countries, airline alliances and other forms of airline joint ventures and agreements are generally subject to anti-trust or trade practices legislation. This is also true in Australia. Airlines that enter into agreements which lead to a 'substantial lessening of competition' may need to seek authorisation from the Australian Competition and Consumer Commission (ACCC) under the Trade Practices Act. In addition, Australian international carriers wishing to operate their services on a joint service or code share basis with other airlines must satisfy the International Air Services Commission (IASC) that an allocation of capacity is in the public interest. In making its assessment, the IASC must have regard to the impact that the joint operation of services will have on competition among other things.

The recent growth in international airline alliances has increasingly focused attention on the impact of such alliances. In particular, regulatory authorities around the world have been keen to ensure that alliances do not lead to a reduction in competition or enable airlines to exercise market power. A study of the economic impact of international airline alliances is therefore important in being able to determine whether existing regulation of airline alliances is being effectively targeted.

Examination of the impact of international airline alliances is complicated by the fact that each individual alliance or agreement is different. The impact is therefore likely to depend on a range of factors such as the extent to which the airlines coordinate their services, the geographical scope of the alliance, the nature of competition on routes on which airline partners operate and the extent to which any barriers to entry exist.

This report seeks to address a number of issues:

- how do airline alliances affect supply, demand and competition in the international airline industry?
- under what circumstances are airline alliances likely to raise market power concerns? and
- what evidence is there that alliances have produced benefits for airlines and passengers?

To answer some of these questions, this report examines a number of studies conducted overseas that quantify the impact of particular airline alliances on, for example, airline revenues, traffic, market shares, service frequency and fares. The Commission also presents its own quantitative analysis which examines the impact of code sharing on fares for international routes to and from Australia.

In examining the economic impact of international airline alliances, the Commission has focused on the market for international passenger air services as distinct from air freight services. It has also confined its analysis to scheduled international air services as distinct from non-scheduled or charter air services.

1.1 The structure of the report

The remainder of this report is structured as follows:

Chapter 2 examines the nature of international airline alliances and the growing trend for airlines to engage in alliances.

A framework examining the economic factors affecting the international airline industry is presented in Chapter 3. It examines the supply and demand side factors of the industry as well as some of the key factors affecting competition, such as restrictions on ownership and control and restrictions on capacity available under air service agreements, and access to airport infrastructure. The relationship of airline alliances to these factors is explained.

The circumstances under which international airline alliances might raise market power concerns are outlined in Chapter 4.

Chapter 5 reviews recent empirical evidence on the impact of alliances on revenues and profits, passenger traffic volumes, flight frequencies, airline market shares and fares. It also presents a quantitative analysis which examines the impact of code sharing on fares on Australian international routes.

Chapter 6 provides some concluding remarks.

2 Recent trends in airline alliances

Although the first alliances between airlines appeared thirty years ago, it is only since the late 1980s that their prevalence has soared. The first airline alliances arose in the US domestic airline industry. A number of domestic carriers sought to achieve cost savings and to better utilise capacity through the operation of joint services and code sharing. Since then, alliances have expanded into other airline markets as well as between countries, regions and on a global basis.

In recent years, airlines have sought to extend the reach of many of their networks through alliances and have entered into arrangements with a number of airline partners. This chapter discusses the nature of international airline alliances. It also provides some evidence of the growth in alliance activity in recent years.

2.1 The nature of airline alliances

The term 'alliance' is often used to describe an accord, partnership, cooperative agreement, joint operation, marketing alliance or 'code sharing' agreement.

Airlines have traditionally entered into 'interline agreements' involving the coordination of, for example, baggage checks, carriage of air cargo and honouring of tickets between airlines. These agreements are generally aimed at facilitating international passenger movements. Under an interline agreement, the identity of each carrier is maintained separately.

However, airlines have increasingly sought to incorporate a wider range of activities in their agreements. As a result, the nature of alliances may differ markedly depending on the range of operations that airlines choose to coordinate. For example, alliances may allow airlines to:

- code share or jointly operate flights;
- coordinate scheduling of aircraft arrival and departure times;
- coordinate the location of arrival and departure gates;
- coordinate frequent flier schemes;
- share airport lounges and other ground facilities;
- coordinate and streamline passenger services such as baggage handling, check-in and ticketing;

- coordinate support services including maintenance and catering; and
- share distribution and retailing functions.

Alliances may be simple, coordinating just one element of operations. Alternatively airlines may enter into complex global alliances whereby partners code share on a large number of routes so as to strategically link their flight networks (GAO 1995). Global alliances also often involve high integration and coordination of flights, scheduling, advertising and frequent flier programs (GAO 1995). Examples of global alliances include the KLM/Northwest and Qantas/British Airways/USAir agreements. Box 2.1 outlines some of the features of the KLM/Northwest alliance which has been referred to as one of the most successful alliances to date (BCG 1995).

International airline alliances sometimes incorporate equity holding arrangements, although the amount of equity that can be held is typically limited in each country (see chapter 3). For example, as part of their recently agreed airline alliance, Air New Zealand purchased 50 per cent of Ansett Australia and 24.5 per cent of Ansett International (Gilchrist 1997). Equity holding arrangements provide partners with a vested interest to ensure that the alliance is successful. However, they are not essential for alliances to be successful — Lufthansa and United Airlines operate a comprehensive marketing and code sharing alliance without either partner holding an equity share in the other. Moreover, alliances can, and do, break down even with equity involvement. The Qantas/Air New Zealand and British Airways/USAir alliances are examples of alliances which have broken down despite significant equity involvement.

Code sharing is a key element of many international airline alliances. Under a code share agreement, one partner (the code sharing partner) assigns its airline designator code to a flight of its partner (the operating carrier). Typically code sharing is accompanied by a suite of other coordinated services designed to provide passengers with smooth connections between flights operated by the partner carriers.

There are a number of ways that carriers can execute a code share arrangement. One partner may purchase a block of seats from the other, with the number of seats available to the code share partner determined up front. Other alliances operate under 'wet leases' where one airline leases an aircraft and its crew from another carrier. Alternatively, the agreement may require the code sharing partner to contact the operating carrier each time a customer requests a seat. The most complex alliances operate sophisticated computerised seat management systems that allow both partners to manage the capacity effectively on a seat by seat basis.

Box 2.1 The KLM/Northwest alliance

In 1989, KLM invested $400 million in the financially troubled Northwest Airlines. The airlines began their joint marketing and code sharing efforts in 1991, with Northwest operating a blocked space code sharing agreement on KLM's Amsterdam–Minneapolis flights. KLM later added an Amsterdam–Detroit route thereby serving both of Northwest's hubs.

In 1992, the United States and the Netherlands signed an open skies agreement which removed all restrictions on travel between the two countries. This enabled the airlines to operate unlimited code sharing between the two countries. The alliance was given further scope in January 1993 when the US Department of Transportation granted anti-trust immunity to the alliance. This permitted the airlines to conduct extensive code sharing, and to jointly market capacity and determine fares without fear of legal challenge from competing airlines.

The main features of the KLM/Northwest alliance include:

- extensive code sharing on North Atlantic, US domestic and European routes;
- global reach — connecting hubs in the United States, Amsterdam and common Asian gateways;
- creation and marketing of a joint international brand — both airlines offer customers the same seats, interiors and dinner plates;
- operation of joint frequent flier programs;
- cost sharing initiatives such as cooperation on ground handling, catering, information services, maintenance and joint purchasing;
- common yield management and accounting systems; and
- combined international fare promotions, joint selling and distribution.

The alliance generated significant increased traffic and revenue for the two airlines. Northwest estimated that it carried an extra 200 000 passengers and earned approximately $US175 million in additional revenues from the alliance in 1994. This increased Northwest's trans-Atlantic revenues by approximately 50 per cent and international revenues by around five per cent. KLM also estimated that it increased its number of passengers carried by 150 000 and revenues by about $US125 million in 1994. This increased its trans-Atlantic revenues by approximately 25 per cent and overall international revenues by three per cent.

Sources : BCG (1995); Gellman Research Associates (1994) and GAO (1995).

The 'reach' of airline alliances may also differ. For example, airlines may enter into alliances or agreements which enable services to be operated jointly on a particular route, on a range of flights within a region, or on a global basis coordinating activities over many countries (BTCE 1996a).

Route or point-specific alliances are the most common. Between 1987 and 1994, they accounted for 50 of the 61 code sharing alliances approved by the US Department of Transportation between US and foreign airlines (GAO 1995). Under a route or point-specific alliance the airline partners code share on a small number of city-pair markets. These agreements often involve one airline buying blocks of seats on the other's flights and reselling them. Qantas and Air Nuigini operate a route-specific alliance which involves code sharing on flights between Cairns and Port Moresby and Mount Hagen.

Regional alliances have wider scope involving cooperation on a limited number of routes within a region. For example, the agreement between United Airlines and Ansett enables passengers to travel to Sydney on a United Airlines flight and connect with Ansett flights to eight Australian cities (GAO 1995). Prominent examples of global alliances include the KLM/Northwest and United Airlines/Lufthansa agreements.

2.2 Growth in alliance activity

Table 2.1 highlights the growth in the number of alliances worldwide. Gallacher (1996) noted that 71 of the 389 alliances in place worldwide in June 1996 have been formed since May 1995.

Table 2.1 Number of alliances, 1994—1996

	1994	*1995*	*1996*	*Per cent change between 1994 and 1996*
Number of alliances [a]	280	324	389	38.9
With equity stakes	58	58	62	6.9
Without equity	222	266	327	47.3
Including code sharing	111	140	180	62.2
New alliances [b]	na	50	71	na
Number of airlines with alliances	136	153	171	25.7

na Not available.
a Includes new alliances.
b Alliances started that ye ar.
Source : Gallacher (1994, 1995 and 1996).

Some carriers operate a large number of alliances. For example, in 1996 the Air France group operated 31 separate agreements, Lufthansa operated 26 and Malaysia Airlines operated 19 (Gallacher 1996).

Code sharing, a feature of many alliances, has grown rapidly in recent years. In 1995 there were 150 international code sharing agreements worldwide. This is six times the number that existed five years earlier (BCG 1995). Gallacher's studies (1994, 1995 and 1996) also found evidence of strong growth in the number of alliances featuring code sharing (see table 2.1).

Alliances are fluid arrangements. Airlines are continuously disbanding old arrangements and entering into new ones. Whilst some alliances may continue for years others may operate for only a short time period.

Survival rates of alliances vary by both geographic scope and equity involvement. Table 2.2 indicates that intercontinental alliances are more likely to break down than regional alliances, which in turn are more likely to break down than domestic alliances (BCG 1995). This may be because the costs of coordination increase as the geographical scope of alliances broaden.

Table 2.2 Survival rates for international alliances, 1992—1995

	Without equity arrangements (per cent)	*With equity arrangements (per cent)*	*Overall survival rate (per cent)*
Intercontinental	23	77	33
Regional	36	80	59
Domestic	na	65	65
Overall rate	26	73	na

na Not available.
Source: BCG (1995).

The Boston Consulting Group (BCG 1995) identified that alliances involving equity appear to have a higher survival rate compared to those without any equity arrangements (see table 2.2).

There are a number of other factors that influence the success of an alliance. Examples include clarity of strategic goals, commitment of resources, commitment of management, complementarity of route networks, realisable cost savings, compatibility of product service standards and similarity of corporate styles (BCG 1995). Conversely, reasons contributing to the failure of alliances include objectives being set too broadly, asymmetry of partners, asymmetry of benefits versus expectations, differing product and service standards, competing priorities and contrasting corporate styles (BCG 1995).

2.3 Alliances in the Asia-Pacific region

Airlines in the Asia-Pacific region have been slower to form alliances than in other regions. It has been argued that this may be because the region is more diverse than Europe or North America, and that the airline industry in the Asia-Pacific region is in a relatively early stage of its development and experiencing very high levels of growth (CAPA 1996). With opportunities for profitable individual expansion, the region's airlines may have been less forthcoming in forming alliances (CAPA 1996).

Nevertheless, there is some recent evidence to suggest that this is changing. The Centre for Asia Pacific Aviation (CAPA) conducts an annual survey of airline and airport executives in the region which highlights, among other things, expectations in relation to future code sharing. In the 1996 survey, 90 per cent of the respondents expected to increase their involvement in code sharing over the following 12 months. This represented a dramatic rise from the survey results of two years earlier where 40 per cent of the respondents expected their code sharing involvement to increase over 1994 (CAPA 1996).

As at June 1996, Australia's two international carriers collectively participated in 15 alliances, 25 per cent more than the previous year and 50 per cent more than two years earlier (Gallacher 1996). Since then, Australia's international carriers have continued to expand their agreements to cover services to a wider number of destinations.

Appendix A presents the details of international airline alliances currently operated by Qantas and Ansett International with a number of other international airlines. These alliances differ in the degree of integration and complexity. For example, Lufthansa participates in Ansett's Global Rewards frequent flier program as part of their alliance. Ansett and Virgin Atlantic operate a route specific alliance involving joint marketing and joint fares on the Australia–UK route via Hong Kong. Other alliances involve greater integration of operations and coordination of code sharing over a larger network.

As of April 1997, 19 international airlines were involved in code sharing between Australia and 13 other countries. These code sharing arrangements operate on a number of different routes and the extent of code sharing differs significantly between alliances. For instance, the agreement between Qantas and Solomon Airlines involves code sharing on three weekly flights between Brisbane and Honiara and offers a total of 162 code share seats a week (Qantas, personal communication, 10 April 1997). In comparison, Ansett International and Malaysia Airlines code share on 11 weekly international flights. Malaysia Airlines also code shares extensively on Ansett Australia's domestic network (Ansett Australia, personal communication, 11 April 1997).

2.4 Regulation of airline alliances

In Australia, both the IASC and ACCC can examine the competitive aspects of airline alliances. Australian airlines which enter into agreements which may 'substantially lessen competition' may need to seek authorisation from the ACCC. Also, Australian international carriers proposing to operate their services on a joint service or code share basis with other airlines must satisfy the IASC that an allocation of capacity is in the public interest.

Trade practices treatment of airline agreements

Section 45 of the *Trade Practices Act 1974* ('the Act') prohibits contracts, arrangements or understandings that have the purpose of, or are likely to substantially lessen competition. Agreements between businesses which involve the fixing of prices (or which in some cases purport to 'recommend' prices but in reality fix prices) are deemed to have the effect or likely to have the effect of substantially lessening competition and are *per se* illegal under section 45A of the Act.

Under the authorisation provisions, the ACCC (formerly the Trade Practices Commission (TPC)) has the power to grant immunity from prosecution for anti-competitive agreements. In considering applications for authorisation, the ACCC may not grant authorisation unless it is satisfied in all the circumstances that:

- the provision of the proposed contract, arrangement or understanding, the proposed covenant, or the proposed conduct, as the case may be, would result or be likely to result in a benefit to the public; and
- the benefits would outweigh the detriment to the public constituted by any lessening of competition.

There have been a number of cases where airlines have sought authorisation for agreements which they have entered into which may be interpreted as leading to a substantially lessening of competition. For example:

- in 1985, authorisation was granted for arrangements among the members of the International Air Transport Association (IATA). The agreements contained arrangements for tariff coordination which covered the majority of scheduled airline services from Australia.

- in 1987, a conditional authorisation was granted for Qantas to enter into arrangements with airlines outside IATA in relation to tariffs. The Agreement was conditional upon there being no enforcement of fares or commission and advertising controls.
- in 1992, a fares agreement was authorised between Australia–Asia Airlines (a subsidiary of Qantas) and China Airlines on behalf of Mandarin Airlines and Eva Airways Corporation.
- in 1995, the Qantas and British Airways Joint Services Agreement was authorised. It provided for the coordination of various aspects of Qantas and British Airways' services between Australia/Europe, Australia/South East Asia and South East Asia/Europe (see box 2.2).

The Qantas/British Airways determination differed from the previous determinations relating to air services (TPC 1995). Previously, the TPC had granted authorisation conditional upon there being no enforcement of pricing or advertising provisions (that is, a recommended rather than mandatory pricing scheme). However, under the Qantas/British Airways agreement, the airlines had agreed that prices and commissions were to be complied with by both Qantas and British Airways rather than being of a recommendatory nature.

It was recently announced that Ansett International and Air New Zealand propose to enter into an alliance with Singapore Airlines to operate services between Australia and Europe via Singapore (Thomas 1997). It is understood that this alliance will be similar to the agreement operated by Qantas and British Airways. It is expected to involve joint pricing by the three airlines on routes between Australia, New Zealand and Europe via Singapore. If entered into, these arrangements are also likely to require approval from the ACCC.

Allocation of capacity to joint operators

The governments of individual nations reserve the right to approve capacity rights established under ASAs for use by its own carriers. In Australia, the IASC is responsible for allocating Australia's international capacity rights to existing and prospective Australian airlines.

Prior to February 1992, Qantas was Australia's only designated international carrier. This prevented other existing and potential carriers from competing for capacity as an Australian international carrier. However, since then the Australian government has introduced a system of multiple designation which has enabled other existing and prospective domestic Australian carriers to provide international air services.

Box 2.2 Authorisation of Qantas/British Airways Joint Services Agreement

In August 1994, Qantas and British Airways sought an authorisation from the Trade Practices Commission (TPC 1995) to enter into a wide-ranging and open-ended agreement which coordinated various aspects of their airline services. The Joint Services Agreement included coordination of scheduling, yield and capacity management, pricing (including all incentives, commissions and discounts), freight and relevant sales and marketing functions. It applied to all services between Australia/Europe, Australia/South East Asia and South East Asia/Europe.

Authorisation was sought because the Agreement contained provisions which would, or were likely to, have the purpose or effect of fixing prices — a *per se* contravention of the Trade Practices Act.

In its draft determination, the TPC argued that competition, especially price competition, came from a small number of carriers and that British Airways was a significant competitor to Qantas. As a result, the loss of competition between Qantas and British Airways might have a significant detrimental effect on competition on Australia/Europe routes. It also argued that opportunities for expansion by competitors were seemingly limited by factors such as capacity rights under ASAs.

In addition, the TPC expressed doubt that the public benefits of the Agreement outweighed the anti-competitive costs. It argued that the cost savings claimed by the airlines were largely private benefits, that the benefits to Australian tourism were limited and the benefits to consumers from interlineable tickets and better seat management were not significantly greater than those available in the absence of the Agreement.

In its final determination, the TPC revised its view in relation to the extent of price competition in the relevant markets on the basis of further information provided to it by the airlines. It considered that the extent of competition was greater than originally determined, although the Agreement may provide the parties with the ability to raise prices to a greater extent than would be the case in the absence of the Agreement.

In authorising the Agreement, the TPC sought to ensure that it would not enable Qantas and British Airways to raise their prices on the Australia/UK route to a greater extent than might have occurred if they operated independently. It sought assurances from both airlines that certain passenger fares would be restrained from increasing in real terms over the next three years. The TPC undertook to monitor net revenue received per passenger by Qantas and British Airways on a representative fare class.

Source : TPC (1995).

The IASC has allocated available capacity on international routes to a number of new entrants including Ansett International (to many routes in South East Asia), Australia Air (to China) and National Airlines (to New Zealand). This has strengthened competition between carriers on many of these routes. It has also granted allocations of capacity to an increasing number of airlines proposing to operate on a joint service or code share basis.

In assessing the merits of an application for an allocation of capacity, the IASC must generally apply specified public benefit criteria. These criteria are detailed in a recent Policy Statement by the Minister for Transport and Regional Development dated 23 April 1997 (Sharp 1997). The criteria require the IASC to assess the extent to which the proposals by each applicant will, among other things:

- promote tourism to and within Australia;
- maximise the benefits to Australian consumers;
- promote international trade;
- contribute to the development of a competitive environment for the provision of international air services; and
- impact positively on the Australian aviation industry.

The recent Policy Statement provides that in assessing the benefit of an allocation of capacity to competing airlines, the IASC must consider whether applicants are proposing to operate capacity on their own aircraft or on a joint service or code share basis. It must also consider the extent to which provisions of any commercial agreement may impact on competition. The Minister has indicated that these criteria should give priority to Australian carriers proposing to operate services in their own right over competing applicants proposing to code share on other airlines (Sharp 1997). However, he has stated that it should not preclude new entrants from using code sharing or other joint services arrangements as a method of entering into markets in the long run (Sharp 1997).

The IASC must include conditions in its determinations relating to the extent to which capacity may be provided jointly. To date, IASC approvals of joint services on various routes have generally included conditions requiring the Australian carrier to price and sell its capacity separately on the route and to refrain from revenue pooling. The IASC considers that these conditions are necessary to ensure that the benefits derived from utilisation of capacity are not neutralised by inappropriate commercial arrangements which detract from the public benefit (IASC 1996).

3 Economics of international airlines

The international airline industry is a complex and dynamic industry which is subject to rapid technological change. Accordingly, it is useful to have an economic framework to analyse features of the international airline industry, including airline alliances. This chapter outlines the major factors influencing supply and demand for international air services and key features of the industry affecting competition.

Whilst this chapter discusses supply and demand factors for international air services separately, it is important to understand that they are both interrelated. Features of supply such as aircraft types, travel times, and the frequency and quality of air services influence the prevailing level of demand. In turn, the level of demand influences airlines' decisions on their supply of those features.

3.1 Supply side factors

The cost of providing airline services is the main driver behind airline supply decisions. Low profitability in recent years has placed increasing pressure on airlines to control and reduce their costs. Even government-owned airlines, for whom profit maximisation may not be the sole objective, place great importance on controlling costs in order to meet their budget constraints and ensure their competitiveness (BTCE 1994).

The major costs associated with the supply of international air services are related to:

- aircraft (hull and engine);
- fuel;
- labour (both in-flight and ground staff);
- airport and en-route services (including runway and navigation facilities);
- airport terminals;
- computer reservation systems;
- passenger coordination facilities (such as check-in and passenger lounge facilities);
- maintenance and hangar facilities;
- advertising; and

- management and corporate services (BTCE 1994).

Airline costs are commonly categorised as direct operating costs (both fixed and variable) and indirect operating costs (see table 3.1). Direct operating costs relate to the physical operation of flights whereas indirect operating costs relate to the other costs associated with operating the business (Doganis 1991). Some costs vary in relation to the pattern, length and frequency of their operations. Others are fixed in nature and may not be readily changed in the short term.

Table 3.1 Structure of airline operating costs

DIRECT OPERATING COSTS	INDIRECT OPERATING COSTS
Variable direct operating costs	Station and ground expenses
Fuel and oil costs	Passenger service costs (eg. staff costs, insurance expenses)
Variable flight and cabin crew costs (eg. subsistence and bonus payments)	Ticketing, sales and promot ion related costs
Direct engineering costs	General and administrative costs
Airport and en route charges	
Passenger service costs (eg. meal and hotel expenses)	
Fixed direct operating costs	
Aircraft standing charges	
Annual flight and cabin crew costs (eg. fixed salaries and other expenses)	
Engineering overheads	

Source : Doganis (1991).

Variable direct operating costs include fuel and oil costs, non-salary payments to crew, landing fees, other airport charges, and passenger meal and hotel expenses. Doganis (1991) highlights the fact that variable direct operating costs sometimes account for between one third and one half of an airline's total costs. Airlines are readily able to affect these costs by varying the number and length of their flights and their choice of aircraft. As a result, significant savings can be achieved in the short term by cancelling a flight or series of flights.

Airlines can make direct cost savings by entering into alliances which allow them to rationalise services, or to establish a presence on a route without actually operating on it. For example, code sharing will enable an airline to save fuel, labour and other variable costs.

Fixed direct operating costs include items such as aircraft depreciation, rental and insurance, fixed crew salaries, maintenance and administration (Doganis 1991). Airlines are able to influence these costs in the medium term, for example, by changing the composition of aircraft fleet, staff numbers and administration costs.

Alliances may allow airlines to reduce these costs. Alliances which affect airlines' variable direct operating costs in the short term, could impact on the fixed direct operating costs if they continue to the medium term. Long-term alliances could have an impact on airlines' decisions on fleet composition, staffing and other fixed operating costs.

Indirect operating costs are the costs associated with the airline business but not directly related to the operation of aircraft. Station and ground expenses, the cost of passenger service, ticketing, sales and promotion costs and administrative costs are all examples of indirect operating costs. Airlines may minimise these costs, for example, by contracting out part or all of their check-in and handling needs at the smaller airports they serve (Doganis 1991).

Joint operation of other activities in an alliance may also lead to cost savings. For instance, joint provision of check-in facilities, ground handling and maintenance services can reduce the costs to participating carriers of providing these services at a given location.

Airlines may possess advantages in their home market through their local knowledge, the development of good relationships with input suppliers and specialised marketing knowledge. These advantages may diminish as an airline moves operations away from its home market. Alliances can combine the marketing, distribution and local knowledge related strengths of each airline in their home market and thereby reduce their indirect operating costs (TPC 1995).

Alliances may also impact on other administrative costs such as the cost of operating computer reservation systems (CRSs). CRSs have become an important competitive tool for airlines. They represent a considerable expense for airlines as they involve high investment costs and continuing additional costs. An alliance allows airline partners to share the costs, or facilitate access to the services of a CRS (OECD 1995).

Whilst alliances may reduce some of the costs faced by airlines, they may also impose some additional costs on airlines. Standardisation of activities between participating airlines in an alliance may increase airlines' operating costs in the short run (Hufbauer and Findlay 1996). Forming the alliance may also impose transactions costs on airlines in terms of the costs of negotiation and additional administrative costs (Hufbauer and Findlay 1996). Where alliances are complex and wide ranging, these negotiations can be time consuming and costly.

Throughout the life of an alliance, airlines face the costs of monitoring the alliance arrangements. Monitoring costs arise largely because it is difficult for alliance partners to control the performance of the operating carrier (Hufbauer and Findlay 1996). Airlines may need to monitor activities such as the standard of passenger service, capacity management and revenue distribution. If alliances are not effectively monitored or are poorly executed, this may affect consumer satisfaction, and ultimately reduce the success of the alliance.

The transitory nature of many alliances increases the significance of these costs. Some alliance arrangements between airlines may only have short lives owing for instance, to partners having different corporate styles, objectives or product and service standards. The more frequently airlines break old alliance arrangements and enter into new ones, the greater is the significance of these costs.

Economies of traffic density and network size

Airline costs may be influenced by economies of traffic density and network size. Economies of traffic density occur when increasing the amount of traffic on an existing route (either by increasing the number of filled seats on a flight or by increasing the number of flights) leads to lower unit costs (Hufbauer and Findlay 1996). Economies of network size arise when an airline is able to reduce its average operating costs by increasing the number of routes or cities it services.

Technical efficiencies underlie the concept of economies of traffic density. Studies have shown that route and aircraft selection can influence airline costs. For example, Tretheway and Oum (1992) identified reduced average costs for airlines where the size of the aircraft used increases (where an aircraft is used over distances for which it was designed), where the number of kilometres flown increases and as the number of seats filled on an aircraft approaches capacity.

Empirical studies from the US and Canadian domestic passenger airline markets suggest that there are significant economies associated with traffic density (Caves, Christensen and Tretheway 1984; Gillen, Oum and Tretheway 1985). For example, Caves, Christensen and Tretheway (1984) estimated that a one per cent increase in the number of passengers would increase total costs by only 0.8 per cent. As a result, increased traffic is likely to reduce average passenger costs.

However, the same studies found very little evidence to support the existence of economies of network size. The BTCE (1994) argued that although the empirical studies do not suggest that there are economies of network size, a considerable network size does enable an airline to operate a hub and spoke system. Hub and spoke systems allow an airline to channel and increase traffic through hub points thereby creating economies of traffic density.

Findlay, Forsyth and Bora (1996) suggested that economies of network size may be more important for international air services rather than domestic services. They argued that in international markets, any cost advantage an airline has because of its home base is diminished. As a result, it may be more economical to tap into another airline's network.

Alliances assist airlines to realise economies of traffic density. For example, airlines may enter alliances which allow them to tap into the network of another carrier to feed traffic on to its routes, or to offer passengers more frequent services on those routes. Greater traffic density may also allow for better utilisation of aircraft. For example, carriers may increase passenger load factors or choose to operate larger aircraft.

Such effects may be particularly important on long haul routes and where traffic densities are low. For example, airlines in the South Pacific have a greater incentive to enter into alliances than in other markets because they have relatively low traffic densities (Hufbauer and Findlay 1996).

3.2 Demand side factors

The demand for international airline services is a derived demand. Typically airline services are not used on their own but in conjunction with other 'products' such as business trips or holidays. As a result, the demand for international airline services is based on the demand for these related 'products'.

Doganis (1991) identified the following factors as generally affecting passenger demand for airline services across all markets:

- the level of personal disposable income;
- fare levels, speed and convenience of air travel;
- the level of economic activity;
- the population size and growth rate; and
- the social environment including length of holidays and attitudes to travel.

Doganis (1991) also identified a number of factors which affect particular routes. These include the attractiveness of a destination to tourists, exchange rate fluctuations, travel restrictions, historical and cultural links, earlier population movements, migrant labour flows, and the nature of economic activity at either end of the route.

Airlines are able to influence demand through their decisions regarding the pricing of air services, network size, scheduling and frequency of flights and other aspects related to the quality of air services. The marketing of these aspects of air services is therefore an important tool for airlines to influence demand.

Alliances present airlines with a number of opportunities to influence the demand for their services. The demand for international air services is highly price elastic, particularly for leisure travellers (Tretheway and Oum 1992). Airlines which achieve cost savings in an alliance, either through cost sharing, better capacity utilisation or process streamlining may be able to increase passenger demand for international air services if they pass these cost savings on to consumers in the form of lower fares. For example, Qantas and British Airways argued that the cost savings available from coordinated and simplified booking procedures would enable them to offer lower passengers fares (TPC 1995).

The BTCE (1994) argued that airlines compete for leisure traffic not just on price but also on the availability of discount seats. Alliances may enhance the ability of airlines to offer discounts. For example, Qantas and British Airways claimed that operation of a joint seat management system would allow them to better monitor seat demand and give them greater scope to offer more discounted seats (TPC 1995).

Passengers are attracted to airlines with comprehensive networks which offer a large number of flight destinations. Alliances enable airlines to offer passengers access to a larger, and sometimes global network. For example, the alliance between British Airways, Qantas and USAir enhanced passenger convenience by offering round the world tickets.

The ability to offer passengers access to a comprehensive network creates distinct marketing advantages for airlines. Doganis (1991) pointed out that while there may be no cost advantages in operating a larger network, airlines that do so may enjoy distinct scale benefits in terms of marketing. Alliances and code share agreements allow airlines to achieve the marketing advantages of greater networks without incurring substantial additional costs (OECD 1997).

The convenience and speed of air travel are important attributes of air services, particularly for business travellers. Business travellers favour airlines which offer direct flights with minimal stopovers and convenient and frequent departures. Alliances involving code sharing may increase the number of flights available for business travellers whose travel requirements may be more sensitive to the scheduling of flights. Improved coordination of international airline services under an alliance arrangement may also increase convenience for passengers through coordinated scheduling, baggage handling, ticketing, check-in and other support services.

By offering higher quality services airlines could stimulate increased demand. Alliances can increase the quality of services when the alliance is formed with a partner offering a higher standard of services, or when the alliance partners jointly invest in service improvements (BTCE 1996a).

Effective marketing schemes by the airlines could also increase the demand for air services. Alliances which allow for coordinated frequent flier programs are one example. In such cases passengers may benefit from access to larger networks over which they can acquire and spend their frequent flier points.

One of the concerns in relation to alliances is that they may increase passenger deception or confusion, particularly where code sharing is involved (Humphreys 1994). For example, many CRSs represent code shared flights as single carrier services. This may create confusion when passengers are not informed that they are actually travelling on a different airline. They may feel deceived particularly when they associate the two airlines with providing vastly different standards of service quality or safety.

Economy-wide impacts

The previous discussion has concentrated on the effect that alliances have on the costs and marketability of an airline's services. However, there may also be other industry or economy-wide impacts as a result of the operation of alliances.

Airlines which are able to reduce operating costs through alliances may put pressure on other airlines to increase productivity and become more efficient. Continual improvements in productivity may enable airlines to reduce prices, develop new services and to expand their operations into new markets.

Other firms or industries using airline services as inputs may benefit through access to lower fares, greater convenience or better quality services. Where this enables the firms or industries to increase their competitiveness, they too can increase their revenues.

Alliances which lead to a reduction in the cost of air services may stimulate increased demand for travel and travel-related goods and services. This in turn may generate demand for the services used by airlines such as catering, maintenance and fuel, which may offset the effect produced by any rationalisation of capacity or reduction in duplication of services between carriers. Alternatively, lower fares might provide consumers with more money to spend on other goods and services.

3.3 Other key factors affecting competition

In addition to the influence of supply and demand side factors, there are a number of institutional features which affect competition between airlines. These features include conditions in air service agreements (ASAs) that restrict ownership and control, and thereby prevent airlines from effectively merging their operations. Also, ASAs sometimes restrict the capacity available for international carriers to fly to particular destinations. Restricted access to airport infrastructure such as landing and take-off slots and airport terminals may also prevent some airlines from operating additional services to particular airports.

Air service agreements

International air services are subject to a complex regulatory framework. The overarching feature of this framework is the bilateral system of ASAs which exist between countries. ASAs are negotiated between governments and establish the nature of arrangements for scheduled international air services to and from particular countries. They generally specify the amount of capacity available to carriers, whether there is provision for single or multiple designation of carriers, named routes, frequency of flights, freedoms of the air to be granted and a method for determining tariffs. The exact nature of these provisions varies between agreements.

There are over 3000 ASAs in operation world-wide. Australia currently operates 50 ASAs with other countries which cover 95 per cent of traffic carried to and from Australia (DTRD 1996b, 1997). The remainder of traffic generally travels via third countries with which Australia does not have ASAs.

ASAs generally formalise third and fourth freedoms of the air — the right of a country to operate services to and from another country. In many cases, ASAs allow for fifth freedom rights, which allow a carrier from one country to fly to another country and then on to a third country, conditional upon the agreement of the third country. Airlines may also face competition on particular routes from sixth freedom carriers which are able to carry traffic between two countries with a stopover in their own country. These rights are not negotiated in ASAs but represent the combination of third and fourth freedom rights. Appendix B provides a brief discussion of the significance of fifth and sixth freedom carriers to competition in the air services market.

Restrictions on ownership under ASAs

ASAs generally apply principles which require that substantial ownership and effective control of airlines rest with the citizens in the country of registration. These principles have the effect of preventing international airlines from merging or obtaining a substantial equity interest in another country's airline.

Whilst it is not compulsory to incorporate rules on ownership and control into ASAs, most countries do so for reasons related to national security and the prestige associated with owning and operating a national airline. There are some exceptions where cross national mergers have occurred, for example, SAS, Air Afrique and Gulf Air (BTCE 1993).

The definition of what constitutes 'substantial ownership and effective control' differs between countries. In Australia, foreign shareholdings in Qantas are currently subject to a maximum of 35 per cent total equity with a maximum of 25 per cent held by any one foreign person. British Airways currently has 25 per cent equity share in Qantas. Air New Zealand has a 24.5 per cent equity share in Ansett International.

Restrictions on ownership and control limit the ability of international airlines to achieve the benefits of large scale consolidation of their operations. In an industry which is essentially global in nature, these restrictions effectively prevent the emergence of global airlines (although not global networks). Airlines have sought to overcome these restrictions to some extent by forming alliances. In particular, code sharing has enabled international airlines to achieve the advantages of operating a seemingly global service without having to merge. In some cases, equity holdings have been incorporated into the alliances thereby cementing the relationship between the participating airlines.

The rapid growth of international airline alliances signifies the desire of airlines to operate more closely than is currently permitted by virtue of these arrangements. This may place greater pressure on governments to revisit the question of whether there is scope to remove or reduce ownership and control restrictions.

Restrictions on capacity under ASAs

Airlines may be constrained from operating, or expanding their services, on certain routes where the capacity negotiated under relevant ASAs is fully utilised. The absence of a competitive threat from other airlines may reduce the pressure for existing airlines to operate efficiently on a route. Restricted capacity may also enable airlines to exercise market power. As a result, prices for air services on capacity restricted routes are likely to be higher, and the quality of those services lower, than would otherwise be the case.

The Industries Assistance Commission (1989) argued previously that ASAs generally have the effect of restricting both the number of airlines serving particular routes to and from Australia, and the extent to which they can compete with one another. As a consequence, the Commission indicated that restricted competition would raise the price of air travel and reduce the range of services offered.

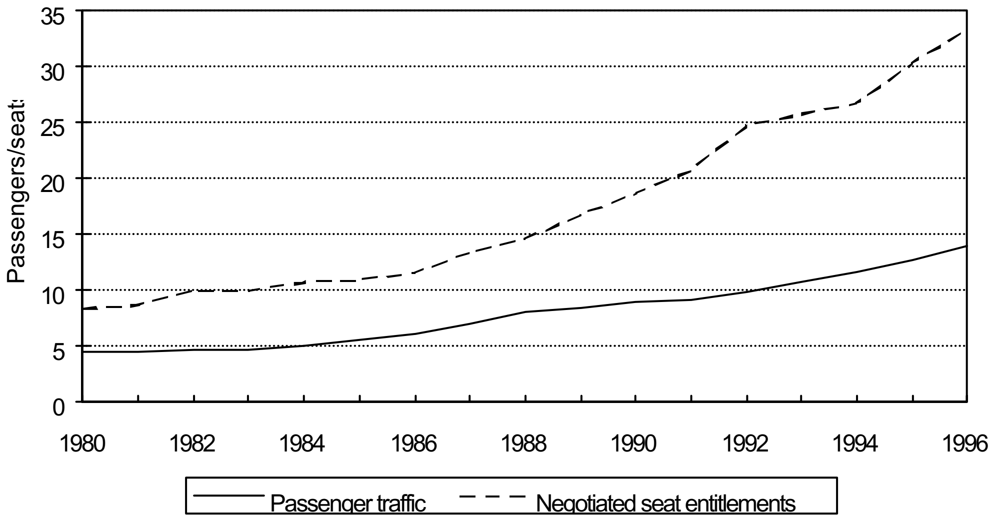
In recent years, a number of reforms aimed at promoting competition in international air services have been undertaken in Australia. For example, prior to 1992 Qantas was Australia's only designated international carrier. Australia now operates a policy of 'multiple designation' which has enabled other existing and prospective Australian carriers to provide international air services.

The Department of Transport and Regional Development (DTRD 1996a) indicated that the Australian Government has sought to negotiate capacity on all routes to provide for both current and projected needs. Bilateral negotiations between June 1992 and June 1996 have doubled the capacity available under ASAs (see figure 3.1). In particular, increased passenger capacity and route entitlements have been negotiated on major routes to countries in the Asian region which serve as important tourist markets for Australian travellers.

Whilst the overall passenger capacity available to and from Australia may be in excess of current capacity utilisation by carriers, the availability of capacity to particular countries may still be a concern. For example, as at 1 January 1997 Australian carriers had no remaining passenger capacity available under its ASAs to fly to Germany, Italy, South Africa, Taiwan, Vietnam and Zimbabwe (DTRD 1997). There were also no frequencies available for Australian carriers to fly to Hong Kong, although there were 243 seats remaining.

These restrictions impede the ability of Australian carriers to expand their services or for new Australian carriers to enter the market, particularly if passenger demand is rising rapidly. Capacity restrictions are likely to enable airlines to charge higher fares for their services than would otherwise be the case.

Figure 3.1 Traffic carried compared with negotiated entitlements, 1980—1996 (millions), Australia



Notes : Passenger traffic figures for 1996 include data up to October 1996. Negotiated seat entitlements include the whole of 1996.
Negotiated seat entitlements do not include freight entitlements, except where there is a substitution formula in the ASAs for converting freight capacity to passenger capacity.
Source : DTRD (1996b).

In addition, restrictions under ASAs may have the effect of penalising efficient airlines. Where Australian carriers are operating more efficiently than foreign carriers, restrictions under ASAs may prevent the former from operating more services and thereby putting pressure on other less efficient carriers to improve their competitiveness.

The unused capacity available to foreign carriers will also be important where there are constraints on the expansion of Australian carriers. For example, where there is increasing passenger demand for travel to a particular destination but Australian carriers have fully utilised all of their available capacity, foreign carriers may still be able to provide additional services to satisfy this demand.

As at 1 January 1997 foreign carriers from Austria, Bahrain, Brunei, Dubai, Egypt, Greece, India, Italy, Mauritius, Netherlands, Singapore and Zimbabwe had no remaining passenger capacity available to fly to Australia under existing ASAs with Australia (DTRD 1997). As a result, the ASAs restrict the ability of foreign carriers to expand their passenger services to Australia and for new carriers to enter the market.

Airlines may be able to overcome these constraints to some extent by forming alliances with other international airlines which may have capacity available to fly to those destinations (Findlay 1996). Australian carriers can jointly operate flights in conjunction with other international carriers and thereby utilise only a portion of their own capacity.

However, there are some cases where both Australian and foreign carriers have no passenger capacity available under the same ASA. For example, both Australian and foreign carriers have fully utilised their capacity entitlements under ASAs to Italy and Zimbabwe (DTRD 1997). Under these circumstances, alliances are unlikely to overcome the restrictions imposed by ASAs. This increases the importance of addressing capacity restrictions under ASAs directly.

Access to international airport infrastructure

Restricted access to airport infrastructure such as landing and take-off slots and airport terminals may be a significant factor impeding entry to international aviation markets. On some routes the level of airport infrastructure has failed to keep pace with rapid growth in passenger demand for travel. This has put pressure on infrastructure and has contributed to problems of congestion at some major airports. As a result, other airlines have been unable to enter the market or expand their services at those airports.

Landing and take-off slots

The scarcity of slots at some airports restricts the ability of airlines to expand their services and for new airlines to commence services. Airlines which hold the rights to land and take-off at those airports may possess market power to raise prices for their international air services.

Landing and take-off slots are normally allocated by airport scheduling committees which apply a set of rules developed by IATA. These rules provide for ‘grandfathering’ which allows airlines which previously had a slot to automatically get it again.

At a number of key airports, the demand for slots outstrips supply. For example, in Japan there are no additional landing or take-off slots available at Narita, Nagoya and Fukuoka Airports. Kansai airport near Osaka is also approaching saturation point at peak times.

In the United States, a formal system of slot trading has developed for domestic flights at a small number of airports. The price paid per slot at some US domestic airports has reportedly varied between $300 000 and $3 million (Jones and Viehoff 1993).

In the European Union, slot trading is not permitted. An airline may only be forced to surrender a slot if it does not use it. As a result, airlines have an incentive to operate slots in order to restrict access to other airlines. For example, at Heathrow, the dominant slot holder — British Airways — has been able to restrict access to other airlines by holding onto slots. It is estimated that the ownership of slots at Heathrow is worth about US$2.5 billion to the airlines (*The Economist* 1997a). The European Union is currently considering options for improving slot allocation at member country airports, including a secondary market in slots.

Levine (1987) argued that the fact that airlines hold on to slots and other airport infrastructure and often avoid making the infrastructure available to other airlines suggests that airlines regard possession of slots as giving them some form of market power advantages. But he argued that this evidence is clouded by the various restrictions imposed by regulators, for example, which prevent airlines from trading access to airport infrastructure with other airlines which value access to infrastructure at particular airports more highly.

A recent study by the US General Accounting Office (GAO 1996) found that airlines often use their control of key landing and take-off slots at large airports in the United States to restrict competition. It estimated that at the ten airports in the United States most tightly controlled by big airlines, average fares were 31 per cent higher than at other large American airports.

Airlines have reacted in a number of ways to the lack of available slots. For example, some airlines have increased the size of the aircraft used in order to increase passenger traffic. However, this has in some cases contributed to growing congestion at passenger terminals. Another approach has been for airlines to enter into alliances with airlines holding slots at congested airports (Gellman Research Associates 1994). For example, American Airlines has sought an alliance with British Airways as a way of landing its flights in Heathrow (*The Economist* 1994).

Increasing passenger demand for travel is likely to place greater pressure on the availability of slots at many airports in the future. Whilst airlines may overcome some of these problems by operating larger aircraft and through alliances, in the long run, the removal of slot constraints and congestion may require a much more structured response from the providers of airport infrastructure.

The BTCE (1996b) recently examined techniques for managing the allocation of landing and take-off slots. It argued that in the long term, increased airport infrastructure is necessary to alleviate problems resulting from capacity constraints, particularly where passenger travel is likely to grow significantly. However, in the interim, demand management techniques, including the auctioning of slots on a competitive basis, could be used to better allocate runway capacity.

Airport terminals

Lack of available terminal space at international airports, and difficulties in securing access to terminal space, may affect competition for international air services. Airlines with rights to terminal space which are able to effectively restrict competition may be able to exercise market power and thereby charge higher fares for air services at those airports.

Restricted access to domestic terminal space was identified as one of the factors which contributed to the failure of Compass in domestic air services. In a review of the failure of Compass, the Trade Practices Commission (TPC 1992) argued that although other factors contributed to its failure, Compass was disadvantaged to some extent by the nature and terms of the access it was given to terminal facilities. More recently, the proposed third domestic airline, Aussie Airlines, has also experienced problems in negotiating access to terminal space which is leased to Qantas by the Federal Airports Corporation.

Access to Australian international airport terminal space is allocated by the Federal Airports Corporation. Whilst there do not appear to be significant problems for air carriers in gaining access to Australian international air terminal space, there may be problems at some overseas airports. For example, in the United States, the US General Accounting Office (GAO 1996) argued that long-term exclusive use of gate leases prevent new and potential operators from securing the necessary airport facilities on equal terms with the incumbent airlines at several important airports. New entrants generally have to sublease gates from the incumbent airlines, often at less preferable times and at a higher cost than the incumbent.

Gellman Research Associates (1994) noted that US carriers have experienced difficulties in securing gates and terminal space at a number of international airports. For example, it alleged that at Tokyo’s Narita airport, US carriers were often relegated to older terminals while Japanese carriers enjoyed newer terminals.

The formation of alliances between airlines allowing for the operation of joint services or code sharing is one way of overcoming problems associated with restricted access to terminal space. Indeed, Gellman Research Associates (1994) argued that code sharing can assist carriers to get around these problems by allowing them to indirectly access to the terminal facilities operated by their foreign code sharing partners.

Whilst alliances may enable airlines to overcome to some extent restricted access to terminal space, it is likely that the removal of these restrictions or better techniques for managing access to terminal space may provide a more effective means of addressing this problem.

4 Airline alliances and market power concerns

Whilst airline alliances may enhance efficiency, in certain circumstances they may increase the partner airlines' ability to exercise market power. An airline with market power can constrain output and raise prices without the fear of a competitive response from other rivals.

There are three major factors that could influence the ability of airlines to enhance their market power through the operation of international alliances:

- the existence of barriers to entry;
- the nature of competition in the market; and
- the features of the alliance.

4.1 Barriers to entry

Barriers to entry may sometimes prevent potential new airlines from entering into the air services industry. They may also prevent existing airlines from commencing new services or expanding their service frequency on a particular route. Chapter 3 identified key features of the international airline industry which sometimes act as constraints to airlines operating air services. These include restrictions on ownership and control of airlines and restrictions on capacity in ASAs, and difficulties in securing access to airport infrastructure.

Whilst these constraints have sometimes provided the impetus for airlines to establish airline alliances, there is a presumption that market power will be heightened where an alliance is formed between two airlines operating on a route characterised by high barriers to entry. Where the airlines party to an alliance raise their fares or seek to limit capacity, barriers to entry can prevent other airlines from responding by entering onto the route and undercutting fares. In these circumstances, regulation of airline alliances will be necessary to prevent airlines from increasing their market power.

However, in some cases, it may be difficult to discern whether market power derived from the existence of barriers to entry is increased by the presence of an alliance. For example, where a route is highly concentrated by virtue of the barriers to entry that exist, any market power that airlines have may arise predominantly from these restrictions (Gellman Research Associates 1994).

In an attempt to remove barriers to entry, the United States has negotiated bilateral open skies agreements with 21 countries, including 12 countries in Europe. For example, the negotiation of the US–Netherlands open skies agreement was an important factor influencing the US Department of Transportation's decision to grant the KLM/Northwest alliance anti-trust immunity to allow the airlines to conduct extensive code sharing, joint pricing and selling of capacity (GAO 1995). It was considered that the removal of capacity restrictions would reduce any market power available to alliance partners by allowing the entry of new carriers on routes between the two countries.

The United States is currently in the process of negotiating an open skies agreement with the United Kingdom. The UK's agreement to an open skies policy was considered necessary in order for the US Department of Transportation to approve the proposed British Airways/American Airlines alliance. Apart from removing restrictions on capacity between these two countries, US carriers hope that the open skies agreement will provide them with greater access to slots at Heathrow airport and beyond rights to other European destinations. UK carriers are seeking rights to fly beyond US gateways to domestic points within the United States.

Whilst restrictions on the ability of airlines to engage in alliances may reduce their scope to exercise market power, it may also lessen their ability to achieve greater efficiency. Instead, the removal of the barriers to entry created by ASAs and restricted access to airport infrastructure may be a more direct way to reduce the ability of airlines to exert market power. An important issue for Australia to examine is whether there is scope to increase competition on Australian international air routes by removing restrictions on capacity in ASAs. In this regard, the US attitude towards open skies policies highlights the importance of removing barriers to entry as a means of reducing market power on particular routes.

4.2 The nature of competition

The nature of competition on a route or market will have an important influence on the ability of airlines to exercise market power through airline alliances. When competition is effective, any attempt by an airline to restrict the number of air services or to raise prices will simply result in a loss of market share to other competitors. Under these circumstances, there is little or no incentive for airlines to raise prices.

The first step in examining the impact of international airline alliances on competition is to determine the definition of the market.

Definition of the market

Determining the extent to which airlines face competition on a route can be a difficult task. The market share that an airline is said to have is heavily influenced by the definition of the market. A market is generally defined to encompass firms which are sufficiently in competition so that a price increase by one would cause a significant number of customers to switch to another firm or would elicit a competitive response from existing firms.

In international air services, the market for international travel may be defined as being between city-pairs, between countries or on a global basis. The appropriate definition will depend upon the reason for travel and the availability of substitutes. These two factors are closely related.

The inclusion of indirect routes that are reasonably substitutable is important in determining the market and the extent of competition faced by airlines. Where airlines have a significant market share between two city-pairs, the availability of indirect routes may provide a competitive threat, particularly on long haul travel.

The degree of substitutability between routes will often depend on the type of passenger. For example, business travellers generally restrict their choices to airlines flying between discrete city-pairs. There may be some scope for business travellers to substitute between routes where stop-overs or transfers are necessary, for example on long haul routes such as Sydney to London where alternative routes include via Hong Kong, Singapore or Bangkok. However, the scope for substitution between many routes will be limited for time-sensitive travellers who may consider only direct non-stop services between city-pairs.

Passengers visiting friends and relatives are likely to be more flexible in their travel choices. Whilst they will generally choose to fly to a particular country or destination, there may be some flexibility in relation to the exact route or number of stop-overs. In comparison, leisure travellers are likely to consider a number of alternative destinations and make travel decisions on the basis of the overall travel package (BTCE 1994).

The appropriate definition of the market has been an important issue for regulators considering the impact that particular alliances are likely to have on competition. For example, in relation to the proposed British Airways/American Airlines alliance, the airlines argued that the relevant market was between the United States and Europe. However, the European Commission considered that the relevant market comprised routes between the United Kingdom and the United States because business passengers are particularly time sensitive and are not likely to accept indirect flights unless there is no direct flight (Avmark Aviation Economist 1996). The application of different market definitions has a significant effect on the resulting market share of the two airlines. For example, the alliance would result in the two airlines having a combined market share of 24 per cent of all traffic between the United States and Europe. However, their combined market share between the United States and United Kingdom would be 61 per cent. On some specific routes, the combined market share of the alliance partners would be even greater — 80 per cent between Heathrow and Boston, 83 per cent between Heathrow and Chicago and 78 per cent between Heathrow and New York. British Airways and American Airlines would face no other competition on at least 13 routes (*The Economist* 1997b).

The appropriate definition given to a market was also considered in the context of the Qantas and British Airways authorisation application to the Trade Practices Commission (TPC 1995). The TPC argued that the existence of a dense network of connecting flights within Europe meant that most flights from Australia to Europe were substitutes for the direct route between Australia and the United Kingdom. As a result, the TPC considered that the relevant market for services between Australia and the United Kingdom comprised travel between Australia and Europe (regional market) and included all airlines servicing those routes.

However, in relation to travel between Australia and South East Asia, the TPC considered that the relevant market for travel was between countries. It argued that unlike flights between Australia and Europe, direct flights without a stop are available for travel to cities in South East Asia. As a result, indirect routes through other cities in the region would be inferior substitutes for direct travel and would be more likely to be considered as separate market segments.

These examples highlight the complexities involved in defining the relevant market for international airline services and the consequences of defining markets either too broad or too narrow. As a consequence, what is considered to be an appropriate definition of a particular market is likely to depend on the circumstances of each case.

Other factors influencing competition

The ability of airlines to exercise market power through alliances will be enhanced where:

- alliance partners together account for a significant share of passenger traffic on a route; and
- there is little or no competition from other airlines on indirect or substitute routes.

A reduction in competition between competing airlines with a significant market share is likely to have a detrimental impact on fares. Evidence from the United States suggests that airline mergers which have reduced competition between competing airlines have led to increased fares for passengers. For example, Borenstein (1990) and Werden, Joskow and Johnson (1991) identified that following the merger between Northwest and Republic Airlines in 1986, fares increased significantly for services which the two airlines had previously operated to Minneapolis/St Paul. Studies have also shown that a reduction in the number of competitors, from three competitors to two and from two competitors to one, can result in a significant increase in fares (Borenstein 1992; Joskow, Werden and Johnson 1994).

The extent to which airlines are in direct (head-to-head) competition has been a major factor affecting the decisions of regulatory authorities to permit alliances between airlines. For example, the US Department of Transportation prevented United Airlines and Lufthansa from jointly setting fares because the two airlines were considered significant competitors in several city-pair markets served by the alliance (GAO 1995).

In comparison, the US Department of Transportation granted anti-trust immunity to KLM and Northwest allowing it to code share, jointly set fares and market capacity on many routes of their networks. However, the US Department of Transportation argued that the high degree of integration that the two carriers have achieved would not violate antitrust laws if the carriers did not have immunity because the airlines were not significant competitors on most routes covered by the alliance (GAO 1995). The main benefit of anti-trust immunity would be to protect the airlines from legal challenge by other airlines and thereby reduce uncertainty.

In relation to code sharing, the competitive impact is likely to depend on whether it involves parallel code sharing or complementary code sharing (Oum, Park and Zhang 1996). Complementary code sharing usually involves code sharing between carriers operating on different but connecting routes, usually to feed traffic between sectors. This type of code sharing may serve to increase competition in certain markets by enabling airlines to connect and code share on services to a destination which they did not previously operate. For example, the alliance between Virgin Atlantic and Ansett International enables those airlines to offer services between London and Sydney via Hong Kong and thereby enhance their competitiveness against Cathay Pacific.

Parallel code sharing involves airlines code sharing on the same route alongside or in place of their own services to increase service frequency or improve capacity utilisation on a route. In certain circumstances, parallel code sharing may effectively reduce the number of competing airlines or services on a route.

Where markets are already highly concentrated, for example by virtue of the barriers to entry, a reduction in competition may increase the market power available to carriers. The proposed British Airways/American Airlines alliance highlights the impact that an alliance between significant competitors can have on the combined market share of airline carriers.

In the longer term, it is unclear whether airline alliances will lead to greater market dominance in the airline industry. For example, US airline representatives expressed concern that alliances may result in airline markets being dominated by a handful of 'mega-carriers' that do not effectively compete with each other and prevent other non-aligned carriers from entering markets (GAO 1995). As a result, the market power of alliance partners may increase over time.

4.3 The features of the alliance

Airlines have traditionally entered into interline agreements with other airlines to coordinate, for example, baggage checks, carriage of cargo and the honouring of passenger tickets between airlines. In some cases, airlines have also sought to coordinate schedules, frequent flier programs and the use of airport facilities in order to facilitate international passenger movements and maximise convenience for travellers. Under these agreements, the provision of air services is separate and airlines are generally able to make their own decisions in relation to the services they provide including frequency, capacity and fares. As a result, they have not generally required government approval.

However, airlines have increasingly sought to engage in alliances incorporating practices such as code sharing and in some cases, joint pricing and selling of capacity (that is, joint marketing) and revenue pooling. Whilst greater coordination between airlines may generate cost savings for airlines and better services for passengers, there may also be risks that the airlines are no longer operating independently. Consequently, alliances incorporating these features have generally required government approval.

Anti-trust authorities, both in Australia and overseas, have traditionally taken a strict view in relation to joint marketing arrangements and revenue pooling. For example, in examining the Joint Services Agreement between Qantas and British Airways, the Trade Practices Commission (now the ACCC) argued that price fixing is one of the most serious forms of anti-competitive conduct which competition law seeks to address (TPC 1995). It indicated that any authorisation application involving a price fixing agreement between competitors must be examined particularly carefully because it may have a significant detrimental effect on competition and efficiency.

In some cases, regulatory authorities have permitted airlines to engage in code sharing subject to the condition that they price and sell their capacity separately and not engage in revenue pooling. For example, in the United States, the Department of Transportation allowed Delta Airlines and Swissair to code share only on the basis of assurances that they maintain separate marketing, sales, pricing and risk of profit or loss for each of the routes concerned (de Groot 1994). In Australia, the IASC has indicated that approvals of joint service arrangements normally include a condition that the Australian carrier must price and sell its services independently on the route and that there be no sharing or pooling of revenue (IASC 1996).

Restrictions on joint marketing and revenue pooling

Restrictions on joint marketing and revenue pooling are generally intended to maximise opportunities for competition between firms operating jointly. Whilst joint production may not always substantially lessen competition, in some circumstances joint marketing and selling and revenue pooling may do so. Restrictions on joint marketing are aimed at ensuring that the benefits of joint operation do not unnecessarily restrict competition between firms as opportunities may still exist for the joint producers to compete in marketing, sales and pricing.

However, restrictions on joint marketing and revenue pooling through airline alliances may not always address concerns of market power. For example, the Commission has previously argued, in relation to the gas industry, that any market power available to gas producers acting jointly arises from the exploration and production leases they collectively control (IC 1995). Even when marketing separately, joint producers can still exercise whatever market power is inherent in their leases by virtue of determining the quantity and terms under which gas is made available to each individual producer. In this case, the Commission argued that the requirement to separately market gas would do little to address market power.

In the joint operation of airline services, joint decisions made by airlines in relation to the number of flights that they will operate will influence the market power available to the participating airlines, particularly where other capacity constraints or barriers to entry exist. For example, where there are few airlines operating on a route because of capacity restrictions in ASAs or difficulties in securing access to airports, a decision to operate jointly and to reduce or rationalise flights on that route may allow airlines to exercise market power. This may occur regardless of whether they decide to jointly or separately market their capacity.

Airlines operating services jointly may also find it difficult to price and sell their capacity separately. For example, de Groot (1994) argued that it will be highly inefficient and costly for two airlines to operate shared aircraft whilst bidding against each other for the same customer on the basis of independent pricing policies.

As a result, the requirement to separately price and sell capacity where airlines jointly decide the amount of capacity to operate is unlikely to effectively address market power concerns. In those cases, restrictions on the ability of airlines to engage in joint marketing may lessen their ability to achieve greater efficiency through cooperation with other airlines. This does not mean that airlines should be able to enter into joint marketing arrangements without demonstrating the clear benefits to the public. Instead, attention should be given to whether the operation of the alliance including joint marketing of capacity, will provide greater opportunities for airlines to exercise their market power.

4.4 Potential overlap in applying competition policy

In Australia, both the ACCC and the IASC have a potential role in examining the competitive aspects of airline alliances. In approving allocations of capacity to Australian carriers, the IASC has generally imposed conditions requiring airlines operating jointly to separately price and sell their capacity and to refrain from revenue pooling. However, airlines which consider that public benefits arise from joint pricing and selling and revenue pooling may be able to seek authorisation from the ACCC. The overlapping jurisdiction between these two regulators may create uncertainty for airlines wishing to engage in airline alliances.

To date, these two organisations have not had to both consider the competition aspects of any one alliance. However, the growth in airline alliances in recent years means that there is an increasing likelihood that the competitive implications of alliances may need to be examined by both organisations simultaneously.

Both the ACCC and the IASC have recognised the potential for overlap and inconsistency in carrying out their respective functions. They have sought to address the potential overlap by signing a Memorandum of Understanding which provides that both organisations will consult on issues examining the application of competition rules to airlines.

The Minister for Transport and Regional Development has sought to clarify the respective roles of the ACCC and the IASC in a recent policy statement (Sharp 1997). In assessing proposals from Australian carriers to operate capacity, the IASC is now required to consider:

- any determinations made by the ACCC or the Australian Competition Tribunal in relation to a carrier operating or proposing to operate on all or part of the route; and
- any decisions or notifications made by the ACCC in relation to a carrier operating or proposing to operate on all or part of the route.

These considerations are intended to minimise the potential overlap and duplication of effort between the two bodies. Further, the Minister has indicated that any assessment by the IASC of the competitive effects of a commercial agreement between carriers should be limited to the comparative benefit to competition and the benefit to the public of an allocation of capacity. Wider responsibility for assessing the possible anti-competitive effects of commercial agreements is the responsibility of the ACCC (Sharp 1997).

Whilst this policy statement goes a long way to minimising the scope for duplication and inconsistency, the potential for overlap may still exist. A clear and workable means to reduce overlap and potential inconsistency is therefore necessary in order to avoid unnecessary compliance costs and uncertainty. Against this background, there would be considerable benefits in both the IASC and ACCC providing greater clarification of their respective responsibilities in examining airline alliances and the circumstances under which alliances are likely to trigger concerns.

5 Impact of airline alliances

The rapid growth in airline alliances in recent years has increased attention given to the economic impact of such alliances. Alliances can potentially produce benefits for airlines, passengers and the economy in general. However, there are also concerns that the potential benefits can sometimes be lost, particularly where airlines are able to exert market power. This chapter examines the available evidence of the economic impact of international airline alliances on airlines, passengers and the broader economy. The Commission also presents results of a quantitative analysis of the impact of code sharing on international airfares to and from Australia.

5.1 Empirical evidence of the impact of alliances

There is very little conclusive evidence about the economic impact of airline alliances. The impact of each alliance is likely to differ depending on the individual characteristics of the agreement between airlines, such as the extent to which the partners coordinate their activities and the geographical scope of the alliance. As a result, most of the available evidence of the impact of alliances is based on case studies of individual alliances between airlines.

Whilst the evidence available from case studies may provide a valuable insight into the potential impacts of alliances, there are a number of reasons why caution should be exercised when interpreting the findings of these studies.

First, many of the estimated gains of alliances are based on information supplied by the airlines involved in the alliances. In some cases, this is likely to result in an overstatement of the potential benefits and an understatement of the potential costs associated with the alliance.

Second, in examining the impact of airline alliances, it is difficult to separate the effect of code sharing from that of the other elements of the alliance such as the operation of joint frequent flier programs, more effective marketing, improvements in the frequency and scheduling of flights.

Third, whilst airline partners may experience an increase in traffic or revenue, this may not be associated with increased generation of traffic or revenue for all airlines flying on that route. Instead, it may represent a redistribution of traffic at the expense of other airlines operating on the route.

Finally, there may be other general trends affecting the gains to airlines. For example, increases in traffic or revenue may represent general market trends rather than the effect of an alliance.

The empirical evidence discussed below is based largely on case studies conducted by the Boston Consulting Group (1995), US General Accounting Office (1995) and the International Civil Aviation Organisation (ICAO) (1996a). Most of this evidence is based on the operation of alliances overseas, particularly on trans-Atlantic routes. There may be an element of risk in assuming that the nature and magnitude of the benefits from overseas alliances is similar for alliances involving Australian airlines. The BTCE (1996a) argued that code sharing on Australian routes may be more beneficial than on denser routes in Europe and the United States because major carriers have limited operations on Australian routes, and traffic levels are lower and more volatile.

The available case studies have attempted to quantify the impact of airline alliances (and particularly code sharing) on:

- airline costs, revenues or profits;
- passenger traffic and market share of passenger traffic;
- passenger fares; and
- convenience and service quality.

The magnitude of the impacts reported here varies considerably between alliances. But a small impact, for instance, does not necessarily indicate an unsuccessful alliance. The scope of the arrangements, and the extent to which partners integrate their operations are important elements in determining the magnitude of an alliance's impacts. The competitive responses of other airlines, and the alliance's influence on competition in the market may also affect the extent of the overall impacts.

Airline costs, revenues and profits

Alliances may assist airlines to lower their costs, improve their revenues and increase their profitability. This is a particularly important benefit in the face of low profitability for the industry in recent years.

Increased revenues from airline alliances generally arise from the increased marketability of an airline's services (that is, increased traffic). The available evidence suggests that some airlines participating in alliances have made significant revenue gains in recent years (see table 5.1).

Table 5.1 Impact of alliances on revenue

Alliance	*Period*	*Impact on revenue* [a]
Northwest KLM	1994 1994	Increase of $125 million–$175 million Increase of $100 million
British Airways US Air	April 1994 – March 1995 1994	Increase of $100 million Increase of $20 million
Varig Delta Airlines	per year (year not specified) na	Expected increase of $44 million na
Varig Japan Airlines	per year (year not specified) na	Expected increase of $21 million na
American Airlines South African Airways	per year (year not specified) per year (year not specified)	Increase of $2 million Increase of $2 million
United Airlines Ansett Australia	not specified na	Increase of $14 million na
Delta Airlines Virgin Atlantic Airways	1995 1995	Increase of $100 million (shared)

na Not available.
a All figures are in US dollars.
Sources : GAO (1995) and ICAO (1996a).

The extent to which airlines have made gains depends largely on the scope and degree of integration of the alliance. For example, the extensive KLM/Northwest alliance is estimated to have generated between $US225 million to $US275 million in additional revenues for the two airlines in 1994 (GAO 1995). In comparison, the American Airlines/South African Airways alliance which is limited to code sharing and joint flights between New York and Johannesburg, and Miami and Johannesburg, is estimated to have increased the carriers' combined revenues by $US4 million a year (ICAO 1996a).

There is some evidence that airlines have made significant cost savings as a result of their alliances. For example, British Airways indicated that it achieved some cost savings from its alliance with USAir between April 1994 and March 1995 in addition to its gain in revenue (GAO 1995).

Whilst alliances have increased revenues for participating airlines, these increases have generally been at the expense of other carriers. For example, Continental Airlines claimed that they had experienced revenue losses of $US100 million in 1994–95 as a result of the KLM/Northwest alliance. Delta also estimated that in 1994 it incurred revenue losses of around $US25 million as a result of the British Airways/USAir alliance (GAO 1995).

In some cases, the revenue gains from alliances have represented a significant proportion of participating carriers' revenues. For instance, in 1994 the KLM/Northwest alliance increased Northwest's trans-Atlantic revenues by approximately 50 per cent and KLM's by 25 per cent. Whilst this represented only five per cent of Northwest's total international revenues, and three per cent of KLM's, over the same period, these gains are significant given the low profitability of the airline industry (GAO 1995).

Traffic and market share

Airlines may use alliances to increase traffic by expanding their operations and accessing new markets, or by offering more attractive services to passengers in their existing markets.

The GAO (1995) noted that alliances are more likely to generate an increase in traffic when the geographic scope of the alliance is wide. Similarly the greater the extent that alliances coordinate activities, such as scheduling, check-in, baggage handling, maintenance and frequent flier programs, the higher the volume of traffic generated. The greater marketability of the airlines' services explains these traffic increases. The greater network size means that the services are able to offer a greater number of destinations and that they are able to be marketed to a wider range of people. Coordinating the airlines' activities produces a more streamlined and hence marketable product.

The evidence from overseas studies of the impact of international alliances suggests that participating airlines tend to experience increased traffic growth (see table 5.2).

The ICAO (1996a) examined 12 trans-Atlantic alliances in place between 1988 and 1994 and covering 42 different city pairs. It found that these alliances generated increased traffic for the partners in 40 per cent of the cases. However, there was no evidence of a strong traffic increase in 45 per cent of the alliances examined.

There are claims that alliances can generate overall traffic growth. Airline representatives and US Department of Transportation officials interviewed by the GAO argued that traffic increases have come from competition among the alliances and between alliance partners and other airlines (GAO 1995). However, they provided no evidence of such traffic increases.

As with revenue, there is evidence that traffic growth among alliance partners often comes at the expense of other carriers. For instance, a comparison of

1993 and 1994 data for the period between April and December revealed that US carriers operating interlining agreements with British Airways lost up to 15 per cent of their traffic to the British Airways/USAir alliance (GAO 1995).

Table 5.2 Impact of alliances on traffic

Alliance	*Period*	*Impact on passenger numbers*
KLM Northwest	1994	Increase of 350 000 (Northwest 200 000; KLM 150 000)
USAir British Airways	1994	Increase of 150 000
Lufthansa United Airlines	June 1994 – June 1995	Increase of 219 000
British Midland Airways 9 airlines	per year (year not specified)	Increase of 100 000
British Midland Airways United Airlines	per year (year not specified)	Increase of 22 000
Delta Airlines Virgin Atlantic Airways	1995	Increase of 250 000

Sources : BCG (1995), GAO (1995) and ICAO (1996a).

By increasing traffic for participating airlines at the expense or in spite of other carriers, alliances will deliver increased market shares for the airlines involved. The ICAO (1996a) found that of the 12 trans-Atlantic alliances studied, participating airlines increased their market share in 48 per cent of the cases. Of the 20 instances where alliances increased market share, European carriers increased their market share in 16 cases and US carriers increased their market share in the remaining four cases. However, there was little evidence of the magnitude of the increase in market share. One indication is that the KLM/Northwest alliance reported an increase in the carriers' combined trans-Atlantic market share from seven per cent before the alliance to 11.5 per cent in 1994 (ICAO 1996a).

A quite different outcome of code sharing is reported in a quantitative study by Oum, Park and Zhang (1996). They examined the effect of complementary code sharing by 'non-leader' airlines on the 'leader' airline's passenger volume on trans-Pacific air routes over the period 1982–92 (where the leader airline is that with the highest passenger share on a route). Their analysis indicated that the presence of this type of code sharing had a tendency to increase the passenger volume of the leader airline. The authors attributed this to the leader airline becoming more competitive and being more highly regarded by passengers in response to the arrangement.

Convenience and service quality

The quality of airline services is an important aspect for passengers. Alliances aimed at increasing service frequency, the number of direct flights between destinations, reducing stopover times and improving in-flight service will directly benefit passengers.

Most studies examining the impact of airline alliances have paid little attention to these aspects of service quality. Whilst they generally acknowledge that these benefits exist, there has only been one attempt to estimate their impact. The ICAO (1996a) found that service frequency experienced no significant change for the majority of the alliances examined on trans-Atlantic routes (57 per cent). Service frequency increased in 14 per cent of the cases. However, service frequency decreased in 29 per cent of the cases.

However, there are a number of examples of how alliances have improved service quality. For example, the alliance between Ansett International and Korean Air enabled Ansett International to double its weekly flights between Australia and Korea. Ansett argued that code share services were necessary to be ‘frequency competitive’ in the Australia–Korea market. It claimed that increased frequency would be beneficial to consumers, particularly time-sensitive business travellers, but also for leisure travellers who would have access to more flexible holiday packages (Ansett 1996).

Airlines also pursue alliances in order to offer a greater number of direct services. Many passengers prefer the convenience of avoiding stop-overs and reduced travel times of direct services. A number of new direct services have been introduced as a result of increased traffic provided by code sharing alliances, including Alitalia’s service between Houston and Rome, Delta Airline’s Cincinnati–Zurich service and Northwest Airline’s Memphis service to Europe (Hufbauer and Findlay 1996). Australian airlines have also entered into alliances that have increased the number of direct flights. For example, the alliance between Qantas and Japan Airlines allowed both carriers to introduce daily direct services between Tokyo and Brisbane, and maintain daily non-stop services between Tokyo and Cairns (Maynard 1996). However, the benefits of these increased direct flights need to be balanced with reduced competition, as a result of Japan Airlines ceasing operations on the Tokyo–Cairns route.

The effect of alliances on other aspects of service quality such as coordinated flight scheduling and improved in-flight services, has received even less attention, with only a few examples being documented. The KLM/Northwest alliance pays a great deal of attention to ensuring that airline services on both airlines are of the same quality by coordinating crew uniforms, aircraft decor and dinner plates (GAO 1995). Qantas claims that its alliances with Solomon Airlines and Air Vanuatu, which include the leasing of Qantas aircraft to both carriers and access to Qantas' extensive marketing network internationally, increases the quality of services in these markets (Qantas, personal communication, 10 April 1997).

Fares

Airline alliances may enable airlines to achieve cost savings, through for example, cost sharing, better capacity utilisation or process streamlining. Where those airlines face a significant degree of competition, these costs savings and efficiencies may be passed on to passengers in the form of lower fares or a greater availability of discounted seats.

The level of competition on a route or given market will have an important influence on the extent to which airlines may pass the cost savings achieved through alliances to passengers in the form of lower fares. Indeed, where alliances allow airlines to exercise market power, they may seek to restrict capacity and increase the level of fares.

There is very little evidence of the impact of alliances on passenger fares. The GAO (1995) study, examined the effect of alliances between US and foreign airlines on airlines' traffic flows and revenues and on consumers. It argued that 'insufficient data exist to determine the effect of alliances on fares'. The report goes further to conclude that the absence of 'complete and accurate data' prevents adequate monitoring of the competitive impact of alliances (GAO 1995).

The study by Oum, Park and Zhang (1996) also examined the effect of code sharing agreements between non-leaders on the market leader's equilibrium price (defined as the lowest unrestricted fare). Their analysis indicated that such arrangements served to reduce the equilibrium price of services supplied by the market leader.

The Commission has conducted a quantitative analysis of the impact of code sharing on fares on international routes to and from Australia. The results of this analysis are presented in the next section.

5.2 A quantitative analysis of code sharing on Australian international routes

This section presents a quantitative analysis of the impact of parallel code sharing on airfares on international air routes to and from Australia. The analysis draws on recent studies which have estimated the impact of market characteristics and other variables on international and US domestic airfares (reviewed below). These studies have utilised a variety of model specifications and estimation methodologies. Only one of these studies examined code sharing, although it was concerned with the impact of ‘complementary’ rather than ‘parallel’ code sharing. The Commission has drawn on these studies to develop its own methodology for examining the impact of parallel code sharing. Further details of the studies reviewed are provided in appendix C.

Review of recent studies

An attempt to quantify the impact of code sharing on international routes has been made by Oum, Park and Zhang (1996). They examined the effect of code sharing agreements between non-leaders on the market leader’s equilibrium price and passenger volume using panel data from 57 trans-Pacific air routes for the 1982–92 period. Their findings showed that complementary code sharing between non-leaders increased passenger numbers carried by the leader by 10 052 persons and lowered its equilibrium fare by $US83. However, it is not clear that similar findings would apply to parallel code sharing, which can increase route concentration where an airline withholds or withdraws its flights from a route.

Market concentration variables may provide an indication of the potential impact of parallel code sharing where it is used as a means of increasing route concentration. Using data collected from 40 Australian international routes over the period from 1983 to 1992, Savage, Smith and Street (1994) analysed the impact of the level of competition on air fares. Their analysis indicated that an increase in competition on Australian international air routes would lead to a reduction in the discount fare, but have little effect on full economy or business class fares. Dresner and Tretheway (1992) analysed the price effects of liberal (pro-competitive) bilateral US air policy using data from international air routes to and from the United States for the period 1976–81. Their analysis showed that the presence of a liberal international air transport policy between the United States and other countries tended to lower discount air fares. Hurdle et al (1989) examined the effect of market concentration and potential entry of alternative airlines on incumbent airline pricing in the United States during 1985. They found that the market structure variable with the most significant positive influence on fares was a measure of industry concentration which included the number and size distribution of incumbents. They also found that the variable with the most significant negative influence was a measure of the number of potential entrants not deterred by economies of scale or scope.

The findings of Evans and Kessides (1994) are also of potential relevance given that code sharing often allows airlines to extend their networks. They examined the effect of multi-market contact on pricing in the US domestic airline industry during the period 1984–88. Their analysis suggested that airfares were higher in city-pair markets served by carriers with extensive inter-route contacts. In relation to the US domestic industry, Evans and Kessides (1993) found that airport dominance by a carrier, as measured by its share of total airport passenger traffic, conferred substantial pricing power on its routes connecting to the airport concerned.

These studies highlight the importance of market concentration variables in explaining variations in airfares across routes and airlines. The Commission has added to these studies by conducting its own analysis examining the impact of code sharing on fares on routes to and from Australia.

Methodology

In its quantitative analysis, the Commission has sought to estimate the impact of code sharing on fares on international routes to and from Australia. This analysis has used a simple demand and supply market clearing model to derive a reduced form price or fare equation. This fare equation has been estimated using three alternative ordinary least squares regression equations. Details of the model specification and estimation methodology are contained in appendix D.

The model examines the impact of code sharing on both standard economy and discount air fares. The fares data is sourced from September editions of *Worldwide Fares*, published by a consortium of airlines. These fares represent published fares filed with governments under bilateral air services agreements and commonly agreed at IATA tariff conferences. However, airlines tend to make seats available to consolidators and travel agents at fares below these published fares, who in turn sell them to the public at fares which they determine on the basis of various commissions, discounts and other incentives. Consequently, most passengers pay fares lower than those published, and the latter can only be regarded as a proxy for fares actually paid by passengers (Qantas 1994). In practical terms, the use of published fares probably serves to underestimate the amount of competition that exists, particularly at the retail level.

The data sample used in the analysis consists of a panel of cross-sectional data consisting of direct city-pair routes into and out of Australia operational as at

September 1996. The time series covers observations between 1992 and 1996, which coincides with a substantial rise in code sharing on Australian international air routes. The total panel includes 60 routes between Australia and 19 other countries, and comprises 248 observations for the economy fare regressions and 239 observations for the discount fare regressions. The routes and the years in which they apply are listed in appendix E.

The analysis focuses on the impact of parallel code sharing as distinct from complementary code sharing. Complementary code sharing usually involves code sharing between carriers operating on different but connecting routes, usually to feed traffic between sectors. For the purposes of this analysis, parallel code sharing has been defined as an arrangement whereby airlines code share services on the same route alongside or in place of their own services. It may also indirectly include complementary code sharing where an airline operates a connecting service to the origin or destination cities of the code shared flight, but this has not been explicitly captured.

Parallel code sharing is more likely to have an impact on the level of competition between carriers on a given route. For example, parallel code sharing may enable airlines to supply services more cheaply and thereby compete more vigorously with other airlines operating on the route. Alternatively, it may provide a means for airlines to exercise market power by reducing the number of competing airlines and separate services on a route. Hence, the net impact of code sharing on fares is likely to depend on the strength of these opposing effects and the number of competitors on the route.

Table 5.3 presents a description of the endogenous and exogenous variables used in the estimation. The principle variables used in this analysis to test the impact of code sharing are a dummy variable to indicate the presence of code sharing on a route (CSDUM) and an alternative which provides a measure of the share of code shared flights to total route flights (CSALL).

Table 5.3 Summary of endogenous and exogenous variables

Variable name	*Abbreviation*	*Description*
Endogenous variables		
Economy fare	$ECONOMY_{it}$	The lowest standard return economy airfare in $A (after weighting for days of availability) offered by any particular airline(s) on route *i* in the September quarter of year *t* expressed in 1992 dollars.
Discount fare	$DISCOUNT_{it}$.	The lowest discount return economy airfare in $A (after weighting for days of availability) offered by any particular airline(s) on route *i* in the September quarter of year *t* expressed in 1992 dollars. Used as an alternative endogenous variable to the economy fare.
Exogenous variables		
Population	POP_{it}	The mean population (in thousands) of the origin and destination cities for route *i* in year *t*.
GDP per person	GDP_{it}	The mean GDP per person (1992 prices in $A) of the countries in which the origin and destination cities of route *i* are located, in year *t*.
Distance	$DIST_{i}$	The shortest one way great circle distance (in kilometres) between the origin and destination cities of route *i*.
Code sharing	$CSDUM_{it}$	Dummy variable indicating the presence of one or more code sharing arrangements on route *i* in the September quarter of year *t*.
Share of code shared flights	$CSALL_{it}$	Number of code shared flights per week offered by airlines actually operating flights on route *i* divided by the flights of all airlines operating on route *i*, plus the number of code shared flights per week offered by airlines not actually flying on route *i* divided by the flights of all airlines actually operating flights on route *i* (all in respect to the September quarter of year *t)*. Used as an alternative variable to the code sharing dummy variable.
Route served by two airlines	$AIR2_{it}$	Dummy variables to indicate that 2 airlines physically operate services on route *i* during the September quarter of year *t*.
Route served by three or more airlines	$AIR3_{it}$	Dummy variables to indicate that 3 or more airlines physically operate services on route *i* during the September quarter of year *t*.

Table 5.3 (continued) Summary of endogenous and exogenous variables

Variable name	*Abbreviation*	*Description*
Route concentration	HHI_i	A Herfindahl-Hirschman index of route concentration, calculated by summing the squared seat shares of the different airlines physically operating services on route *i* in the September quarter of year *t*. Used as an alternative variable to the above two dummy variables for the number of airlines.
Share of residents departing on business	$BUSAUS_{it}$	Resident departures for business purposes travelling to the country in which the destination city of route *i* is located, expressed as a proportion of total departures to that country during year *t*.
Share of foreigners arriving on business	$BUSFOR_{it}$	Foreign arrivals to Australia for business purposes travelling from the country in which the origin city of route *i* is located, expressed as a proportion of total arrivals from that country during year *t*.
Number of competing routes	$COMPR_{it}$	The number of alternative routes which pass through the origin and destination cities of route *i* during the September quarter of year *t*.
Fuel price	$FUEL_t$	The average spot wholesale price of US aviation fuel in $A per litre in year *t* expressed in 1992 prices.

A number of other variables have also been included in the regression equations to estimate the impact of market structure on fares. For example, variables indicating the number of competing airlines (AIR2 and AIR3) and the level of route concentration (HHI) are designed to capture the degree of competition on a route. Economic theory suggests that in general prices should be lower where there are more competitors and a lower level of market concentration.

The number of competing routes (COMPR) aims to capture the main substitution possibilities for the route and to account for an element of competition that the other competition related measures may not capture. It is expected to have a negative influence on airfares, given the greater number of substitution possibilities that exist with greater availability of alternative routes.

Distance of the route (DIST) is included on the basis that it is a key cost driver for direct route costs, particularly for fuel and variable crew costs (Doganis 1991). Consequently, distance should have a positive influence on route fares.

The proportion of business travellers on a route (BUSAUS and BUSFOR) are assumed to be important in determining the price of economy and discount fares due to the effect on yields and substitution possibilities. It is expected that the higher the proportion of business travellers the more likely that airlines will seek to offer higher yielding business class seats and also not wish to offer low economy or discount fares on the basis that price sensitive business travellers may seek to travel economy instead. These variables are thus expected to have a positive influence on both discount and economy fares.

The price of aviation fuel (FUEL) is expected to be an important determinant of airfares over time, as it is one of the main operating costs of aircraft. It is expected to have a positive influence on fares.

A full description of the variables, including details of their derivation and sources can be found in appendix F.

Results of quantitative analysis

Table 5.4 presents a summary of the results from estimating three separate variations of the reduced form regression equation for the two fare types. In table 5.4, columns (1) and (2) under each fare class differ in the way code sharing is modelled. In column (1) under each fare class, the presence of a code sharing arrangement is indicated by a dummy variable. In column (2) under each fare class, the level of code sharing is measured as the number of code shared flights operated as a proportion of total physical route flights (that is, code shared flights between airlines flying on the route plus code shared flights offered by airlines not flying on the route divided by total route flights). Column (3) under each fare class is similar to column (1) — the difference being that airline concentration on a route is measured by a Herfindahl-Hirschman index rather than by the use of dummy variables to indicate the number of airlines.

Descriptive statistics and more detailed results (including the coefficients for all equations and tests of significance) are contained in appendix G.

The results of the quantitative analysis suggest that the presence of code sharing (when expressed as a dummy variable) has a negative and significant effect on economy fares. Relative to the mean fare of $2 266, economy fares are estimated to be on average about 10 per cent lower where code sharing is present. When code sharing is expressed as a proportion of code shared flights to total flights it also has a negative and significant effect on economy fares. These results suggest that code sharing contributes to reduced operational costs and/or greater competition between airlines, which are passed on to passengers as lower economy fares.

Table 5.4 Summary of results

Exogenous variable	*Endogenous variables*					
	Economy fare			*Discount fare*		
	(1)	*(2)*	*(3)*	*(1)*	*(2)*	*(3)*
Population	.	.	.	++	++	++
GDP per person	—	—	—	—	—	—
Distance	++	++	++	++	++	++
Code sharing	—	na	—	.	na	.
Share of code shared flights	na	—	na	na	.	na
2 airlines on route	.	.	na	.	.	na
3 or more airlines on route	.	.	na	.	.	na
Route concentration	na	na	.	na	na	.
Share of residents departing on business	.	.	.	+	+	+
Share of foreigners arriving on business	—	—	—	—	—	—
Number of competing routes	.	.	.	—	—	—
Fuel price	+	++	+	++	++	++

++ (––) Indicates positive (negative) significance of the estimated coefficient at the 5 per cent level or less.
+ (–) Indicates positive (negative) significance at less than 10 per cent but above 5 per cent (two sided test).
. Indicates that the coefficient is not significant under the preceding tests.
na Indicates that the variable was not included in the equation.

However, similar results do not hold for discount fares. The presence of code sharing exhibits an insignificant relationship with discount fares. An explanation for the different results between standard economy and discount fares may be that the market for discount fares is subject to intense competition and low profit margins given the presence of substitute destinations, charter flights and a high price elasticity of demand for discount travel (Doganis 1991). Indeed it is rational for airlines to reduce the price of economy fares rather than discount fares in the hope that it may encourage some substitution from discount to economy fares and serve to improve overall profit margins.

The degree of competition, when measured either as dummy variables for the number of airlines or a Herfindahl-Hirschman index, does not have the expected strong impact on the level of economy and discount fares. Instead, the coefficients are small and statistically insignificant. One possible explanation for this result is that when there is only one or a small number of airlines operating on a route, prices are maintained at a competitive level in order to deter entry of other airlines. It may also offer airlines more opportunity for price discrimination by offering a lower fare to particular travellers. In addition, when there are several airlines, the likelihood of another entrant may be lower. Each airline might be wary of beginning a price war that would be harmful to all of them, leading to less competition on price than may be expected.

The number of competing routes has a statistically significant negative effect on discount fares, but not on economy fares. Nevertheless, the magnitude of the coefficient is quite small. This result suggests that substitution between routes is more likely by a discount traveller, consistent with what would be expected.

The distance and fuel price variables both have strongly positive and significant influences on both economy and discount fares. Each one kilometre rise in distance is estimated to add about 43 cents to the economy fare and 13 cents to the discount fare. The coefficients on the fuel price indicate for example, that a 10 cent per litre rise in the wholesale price of fuel would on average add a couple of hundred dollars to the economy and discount fares.

The proportion of business travellers leaving Australia to particular country markets is positively correlated with the level of discount fares. An explanation for this result might be that business travellers provide airlines with a higher return per seat than leisure travellers. As a result, they would be unlikely to seek to promote leisure travel at its expense. Surprisingly, the results for foreign business travellers are negative, significant and of a large magnitude. This may be because markets with a high proportion of business arrivals may have greater traffic. The effect may therefore be caused by this higher traffic density which translates to lower fares due to greater aircraft utilisation and the use of larger aircraft.

Of the population and GDP per person variables, the signs are mainly the opposite of what is expected (the exception being the positive sign of population with respect to discount fares). Nonetheless, the magnitudes of the coefficients are low suggesting that these variables are likely to have a greater effect on the quantity of travel demanded than on the price.

This analysis has not attempted to take into account the impact that code sharing has had on aspects of service quality on these routes. For example, whilst code sharing may reduce fares on these routes, there may also be impacts on frequency of flights, the number of direct flights and quality of in-flight service. As a result, this analysis does not provide an indication of the net impact of code sharing on international routes to and from Australia, but the analysis would be enhanced by incorporating some of these aspects.

The analysis may also be limited by the use of published fares data. Yield data by route may provide a better indication of how code sharing affects airline profitability and the extent to which airlines pass on any gains from code sharing. Notwithstanding this a break down of the number of passengers utilising particular fare types by route would have enabled a single weighted average fare to be constructed. A more accurate indication of the impact on consumers could have been obtained by the use of retail fares. These alternative price measures were not readily accessible by the Commission.

Overall, the quantitative analysis presented here suggests that the presence of code sharing on international routes to and from Australia is estimated to have lead to a reduction in standard economy fares. There also appears to be a significant negative relationship between the proportion of code shared seats and the level of standard economy fares on that route. However, these two code sharing variables have an insignificant effect on discount fares. This result may point to the presence of tight profit margins in the discount fare market reflecting the already strong competition in this market segment. Indeed it is expected that airlines would reduce the price of economy fares rather than discount fares on the basis that it may encourage some substitution from discount to economy fares and serve to improve the profit margin on a route.

6 Concluding remarks

Alliances between international airline carriers have experienced significant world-wide growth in recent years. This trend has also been prevalent in Australia, with Australia's major international carriers operating a number of alliances with other international airlines. Code sharing has been a major feature of many of these alliances.

International airline alliances have emerged in response to a number of features of the airline industry. Low profitability has placed increasing pressure on airlines to improve their efficiency and competitiveness. Restrictions on cross border mergers between international airlines have forced carriers to search for new ways of achieving the benefits of consolidation and global operation. Restrictions on capacity in air service agreements and difficulties in securing access to airport infrastructure have also provided airlines with the impetus to seek airlines alliances as a means of overcoming these constraints.

The rapid growth in alliances is a reflection of the benefits that airlines perceive are achievable through closer cooperation. Alliances provide airlines with opportunities to increase their own efficiency. For example, alliances enable airlines to commence operations on a route, to increase the size of their network, to feed traffic between airlines and networks and to improve capacity utilisation on existing routes. They may also allow airlines to share costs or reduce duplication of services associated with various aspects of airline operations such as catering, maintenance and operation of airport lounges. Where these benefits are passed on to passengers either through lower fares or more convenient or better quality services, it may stimulate greater demand for air travel and in turn, stimulate demand for goods and services used by airlines as well as those in travel associated industries such as tourist accommodation and hospitality.

Alliances also represent a means of increasing the marketability of airline services for participating airlines. Airlines which offer a larger network and greater convenience are likely to attract a greater number of passengers and thereby increase their market share.

Whilst potential efficiencies may arise from the operation of international airline alliances, in certain circumstances they enable airlines to exercise their market power. For example, the existence of barriers to entry affecting the airline industry generally, or a particular route, will influence the extent to which airlines can compete against each other. Where barriers to entry are high, rival airlines may not be able to respond where the formation of an alliance serves to enhance the market power of participating airlines. Alliances between airlines which effectively control a large amount of the capacity on a route and which face little or no competition from other airlines on alternative or substitute routes are also likely to increase their market power. Under these circumstances, airlines will be able to restrict capacity, increase passenger fares and/or lower the convenience or quality of services.

Not all features of airline alliances will raise concerns of market power. For example, alliances which seek to share costs such as catering, maintenance and operation of airport lounges are not likely to pose a serious threat to competition. However, where alliances enable airlines to make decisions jointly about the capacity that they will operate or the price of airline services, there is a greater risk that the airlines are no longer operating independently. As a result, the potential for anti-competitive behaviour or market power may be greater.

This report has emphasised the importance of effectively targeting any anti-competitive behaviour of international airline alliances to ensure that any restrictions on the ability of airlines to engage in alliances reduce or minimise the scope for market power. Competition among airlines is restricted in a number of ways by barriers to entry which restrict ownership and control of airlines, capacity available to airlines to compete in certain markets and access to airport infrastructure. It is likely that the removal of these barriers through a process of well-targeted deregulation would further increase competition and reduce the scope for any market power that is likely to emerge as a result of airline alliances.

In some cases, restrictions imposed on the ability of airlines to engage in airline alliances may reduce the scope for airlines to achieve greater efficiency through closer cooperation, without necessarily reducing any market power available to the airlines. This does not mean that airlines should be able to enter into alliances without demonstrating the public benefit of such arrangements. Instead, attention should be given to whether the operation of the alliance will provide greater opportunities for the airlines to exercise their market power.

Under existing regulation, there is a potential for overlap between the roles of the IASC and ACCC in examining the competitive aspects of alliances. A clear and workable means to reduce overlap and potential inconsistency is necessary in order to avoid unnecessary compliance costs and uncertainty. The recent policy statement by the Minister for Transport and Regional Development goes a long way to minimising the scope for overlap between the two agencies. There would be considerable benefits in the IASC and

ACCC providing greater clarification of their respective responsibilities in examining airline alliances and the circumstances under which alliances are likely to trigger concerns.

In this report, the Commission has examined the available evidence on the impact of airline alliances. The benefits achieved by airlines are largely related to the extent to which the airline partners coordinate their activities and the geographical scope of the alliance. In some cases, alliances have led to significant revenue growth for airline partners (GAO 1995; ICAO 1996a). Significant increases in traffic are likely to be an underlying reason for such revenue growth. There is some evidence that airlines have achieved cost savings through alliances.

Although there is evidence of revenue and traffic growth for alliance partners, this growth generally represents a redistribution of traffic and revenue away from other airlines participating on the route rather than overall traffic and revenue growth for the industry (GAO 1995). Consequently, the airline alliances examined have increased market shares for participating airlines rather than expanding the growth in demand for travel.

Whilst there is evidence that airlines have benefited from alliances, evidence of the benefits to passengers is less clear. In relation to service frequency, the evidence is mixed (ICAO 1996a). The impact on passenger fares and other service quality aspects has been largely unchartered. However, there are a number of examples where alliances have increased service frequency, improved the convenience of travel by reducing the number of stopover points, and improved in-flight service standards.

In this report, the Commission has conducted a quantitative analysis of the impact of code sharing on fares on Australian international routes using a simple econometric model. The results from this analysis suggest that the presence of code sharing on Australian international routes is associated with a reduction in standard economy fares. There also appears to be a significant negative relationship between the proportion of code shared seats and the level of standard economy fares on that route. However, these two code sharing variables do not have a significant effect on discount fares. This result may point to the presence of low profit margins for discount fares arising from stronger competition in this market segment and a desire by airlines to encourage substitution to standard economy fares. This analysis has not attempted to take into account the impact that code sharing has had on aspects of service quality on these routes. For example, whilst code sharing may reduce fares on these routes, there may also be impacts on frequency of flights, the number of direct flights and quality of in-flight service. As a result, this analysis does not provide an indication of the net impact of code sharing on Australian international routes and could be enhanced by incorporating some of these aspects into any future research.

6.1 Areas for further research

The need for better data

In Australia, there has been no systematic collection of data which would enable a thorough analysis in relation to the impact of international airline alliances. The lack of publicly available and reliable data makes it difficult to conduct a comprehensive analysis of the impact of these alliances and, in particular, the long term effect of alliances on the international airline industry.

The recent growth in airline alliances, and the likely continuation of this trend, makes it imperative that there should be a better process for collecting data and monitoring the effects of such arrangements. Better data would enable the Commission and other agencies to more fully assess the benefits and costs of airline alliances and promote a better understanding of the circumstances under which alliances may affect competition and enhance the ability of airlines to exercise their market power. This would then provide a better foundation for an analysis of the effectiveness of existing policies in targeting potential anti-competitive behaviour and market power created through airline alliances .

Regulation of international air services and infrastructure

The discussion in this report highlights a number of other issues related to competition and the regulation of international air services more broadly. In particular, it highlights the role that barriers to entry play in the market for international air services and their effect on competition. The removal of these barriers to entry should be an important priority for the Government. This raises a number of issues which are worthy of further research including:

- What effect would the removal of restrictions on ownership and equity in ASAs have on the incentive for international airlines to operate airline alliances and for the structure of the international airline industry?
- What scope is there to increase competition on Australian international air routes by removing restrictions on capacity in ASAs? For example, should Australia give consideration to some form of open skies policy?
- How can access to international airport infrastructure be improved?

Appendix A Alliances operated by Australian carriers

In Australia, both Qantas and Ansett International operate a number of international airline alliances with other airlines. The following tables outline the airlines' major alliance partners and a brief description of the main characteristics of each agreement. This information has been supplied by Qantas and Ansett International and is current as at April 1997. It does not include information in relation to proposed agreements which were not operational at that time.

Table A.1 Alliances between Qantas and other airlines[a]

Carrier/partner	*Details*
Air Calin	Code share on Air Calin flights between Melbourne–Noumea. Both airlines code shares on each others flights between Sydney/Brisbane and Noumea.
Air Niugini	Code share on some Air Niugini flights between Cairns–Port Moresby.
Air Pacific	Code share on Air Pacific flights between Sydney/Melbourne/Brisbane–Nadi and Nadi–Los Angeles. Code share on Qantas flights between Sydney/Melbourne–Nadi. Air Pacific participates in Qantas' frequent flier program (FFP).
Air Vanuatu	Code share on Air Vanuatu flights between Sydney/Brisbane–Port Vila and Melbourne–Sydney–Port Vila.
Air Zimbabwe	Code share on Qantas flights between Sydney–Perth–Johannesburg/Harare–Harare/Johannesburg–Perth–Sydney.
American Airlines	Code share on Qantas flights between Sydney–Los Angeles. FFP cooperation.
Asiana Airlines	Both airlines code share on each others flights between Sydney/Cairns–Seoul.
British Airways	Joint FFP, airport lounges and sales offices. Reciprocal ground handling and catering. Global freight cooperation. Marketing coordination on various routes between Australia and South East Asia and Europe. Code share on Qantas flights between Auckland–Los Angeles [b].
Canadian Airlines International (CAI)	Code share on Qantas flights between Melbourne/Sydney–Honolulu. Code share on CAI flights between Vancouver/Toronto–Honolulu. FFP cooperation.
Japan Airlines	Code share on Qantas flights between Cairns–Narita (Tokyo). Code share on Japan Airlines flights between Brisbane–Narita (Tokyo).
Solomon Airlines	Code share on Solomon Airlines flights between Brisbane–Honiara.
USAir	Code share on USAir flights between Los Angeles and San Francisco. FFP cooperation.

a Qantas also offer 22 round the world fare combinations in conjunction with 25 international airlines.

b Qantas and British Airways' code share between Auckland–Los Angeles does not form part of the Joint Services Agreement.

Source : Qantas.

Table A.2 Alliances between Ansett International[a] and other airlines

Carrier/partner	*Details*
Aerolineas Argentinas	Code share on Ansett flights between Sydney–Auckland.
Air New Zealand	Fifty per cent equity in Ansett Australia and a 24.5 per cent share in Ansett International.
	Code share on Ansett flights between Sydney–Kuala Lumpur and Sydney–Auckland. Code share on Air New Zealand flights between Sydney–Auckland and Brisbane–Auckland. Code share on Ansett domestic flights including flights between Adelaide, Brisbane, Canberra, Cairns, Coolangatta, Darwin, Hobart, Launceston, Melbourne, Perth, Sydney and Townsville.
	Global Rewards frequent flier partner.
All Nippon Airways	Global Rewards frequent flier partner.
Austrian Airlines	Global Rewards frequent flier partner.
Cathay Pacific	Global Rewards frequent flier partner.
EVA Air	Code share on each others flights between Sydney–Taipei.
Korean Air	Code share on Ansett flights between Sydney–Seoul. Code shares on Korean Air flights between Sydney–Seoul–Brisbane.
KLM	Code share on Ansett domestic services to Sydney, Brisbane, Canberra, Melbourne, Adelaide and Cairns.
Lauda-Air	Global Rewards frequent flier partner.
Lufthansa	Global Rewards frequent flier partner.
Malaysia Airlines	Code share on Malaysia Airlines flights between Kuala Lumpur–Melbourne/Sydney/Adelaide. Code share on Ansett flights between Sydney–Kuala Lumpur. Code share on Ansett domestic services to Adelaide, Cairns, Canberra, Gold Coast, Hobart, Melbourne and Sydney.
Royal Tongan	Code share on Ansett flights between Sydney–Auckland.
South African Airways	Global Rewards frequent flier partner.
Swissair	Global Rewards frequent flier partner.
Thai Airways	Global Rewards frequent flier partner.
United Airlines	Code share on Ansett domestic services to Adelaide, Brisbane, Canberra, Coolangatta, Hobart, Melbourne, Perth and Sydney. Global Rewards frequent flier partner.
Virgin Atlantic	Marketing agreement and joint fares between the United Kingdom and Australia via Hong Kong.

a Code sharing alliances on international routes are formed between the foreign partner and Ansett International, those on domestic routes are between the foreign partner carrier and Ansett Australia.

Source : Ansett International.

Appendix B Fifth and sixth freedom carriers

Chapter 3 provided an overview of the role of ASAs which establish the nature of arrangements for scheduled international air services to and from particular countries. ASAs incorporate a basic system of air service rights commonly referred to as freedoms of the air (see box B.1). These freedoms provide the backbone for negotiating capacity rights between countries under each ASA.

Box B.1 Freedoms of the air

The Chicago Convention in 1944 resulted in an agreement to establish international aviation rights of passage, referred to as freedoms of the air:

First freedom	the right of an airline of one country to fly over the territory of another country without landing.
Second freedom	the right of an airline of one country to land in another country for the purposes of refuelling or maintenance only.
Third freedom	the right of an airline of one country to carry passengers and freight from its country to another country.
Fourth freedom	the right of an airline of one country to carry passengers and freight from a second country to its own country.
Fifth freedom	the right of an airline of one country to carry traffic between two other countries provided the flight commences or terminates in its own country.
Sixth freedom	the right of an airline of one country to carry traffic between two other countries via its own country. Sixth freedom rights are not negotiated in ASAs but represent the combination of third and fourth freedom rights.

Most of the traffic carried between countries is generally operated by third and fourth freedom carriers. However, most ASAs allow for fifth freedom rights which permit a carrier to fly between two foreign countries. For example, the Australia–Hong Kong ASA provides Australian carriers with the opportunity to fly on to other locations such as Japan carrying Hong Kong–Japan passengers. Fifth freedom rights are conditional upon the agreement of the third country (in the case of this example, Japan). There are also 'intermediate' fifth freedom rights. For example, an Australian airline flying to the United Kingdom via Singapore can carry Singapore–UK traffic.

The negotiation of these 'intermediate and beyond rights' is often a significant factor influencing the potential for competition in the operation of air services between two countries. Fifth freedom rights may be particularly valuable to individual airlines as they provide an opportunity for carriers to generate traffic between two foreign countries. Indeed, fifth freedom rights have been the subject of intense negotiations between countries where carriers from one country have generated significant traffic on the beyond route, to the detriment of carriers in the second country.

In Australia, 49 of the 50 ASAs include provisions relating to fifth freedom rights (DTRD, Canberra, personal communication, 28 February 1997). However, in some ASAs, these provisions can be quite restrictive allowing for fifth freedom rights on only a small number of routes and with limited frequencies. For example, under Australia's ASA with Japan, Australia has no beyond rights and intermediate rights may only be exercised to Tokyo. Under Australia's ASA with Hong Kong, there are restrictions on the number of passengers that may be carried, and the number of weekly frequencies that can be operated on fifth freedom sectors. For example, the maximum amount of fifth freedom traffic allowed to carriers of both countries is the higher of 50 per cent of the capacity of the aircraft or 200 passengers per flight.

In addition to the capacity entitlements for international carriers in ASAs, airlines may face competition on particular routes from sixth freedom carriers. Sixth freedom carriers are airlines which are able to carry traffic between two countries via their own country. Such rights are not recognised as such in ASAs but are a function of being favourably located geographically and combining two ASAs back-to-back. For example, Singapore Airlines can carry passengers between Australia and the UK under its separate ASAs with each country, thus supplementing capacity under the Australia–UK ASA.

Sixth freedom carriers provide significant potential competition to third and fourth freedom carriers, particularly on long haul routes such as between Australia and European countries where they can offer the same one-stop service as the third and fourth freedom carriers. This is largely because technical limitations of aircraft require a stop at an intermediate point on long haul travel (Qantas 1994). Sixth freedom carriers use their home base as their intermediate point and connect with services to other parts of their networks.

Sixth freedom carriers have a high market presence on routes between Australia and Europe. For example, carriers from Singapore, Thailand, Malaysia, Indonesia and Hong Kong compete with Qantas and British Airways for travel between Australia and the United Kingdom and Europe. Combined they carry over 40 per cent of Australia–UK/Europe passengers. Their presence on the route is important from a competition point of view particularly as Qantas and British Airways are now effectively operating as partners under their Joint Services Agreement.

Whilst sixth freedom carriers may have a substantial market presence, the UK Civil Aviation Authority (1994) argued that third and fourth freedom airlines, such as British Airways and Qantas still enjoy a ‘home advantage’. As a result, third and fourth freedom carriers are likely to continue to have a stronger presence individually than fifth and sixth freedom carriers.

Appendix C A summary of recent empirical studies

A number of recent empirical studies have estimated the impact of airline market structure on airfares using regression analysis (see table C.1). These studies have attempted to account for route and airline price and output effects of various market characteristic variables using a range of regression techniques. Of the six studies summarised in the table, only three are concerned with the international aviation industry. The remainder examine the US domestic airline industry. Three of the studies examined route specific price effects while others focussed on individual airline pricing or output behaviour on routes.

Table C.1 Recent empirical studies of the effect of airline market structure on pricing

Purpose	*Industry and sample*	*Estimation methodology*	*Dependent variable(s)*	*Independent variables*	*Key findings*
Oum, Park and Zhang (1996)					
Measure the impact of complementary code sharing agreements between non-market leaders on the market leader's price and passenger volume.	International. Panel data of 57 trans-Pacific routes for the period 1982–92, comprising a total of 471 data points.	Leader's residual demand equation and a supply relation estimated by a non-linear three stage least squares procedure.	*Demand equation:* Market leader's annual passenger volume on a route. *Supply relation:* Lowest unrestricted fare offered by the leader airline in June each year.	*Demand:* price, leader's flight frequency, non-leader's flight frequency, non-leaders input price (based on a unit cost index for major airlines), and dummy variables for presence of subsidiary connecting services and code sharing. *Supply:* passenger volume, leader's input price, route distance, number of firms providing service, leader's market share, and dummy variables for presence of subsidiary connecting services, code sharing, different years and route groups.	Complementary code sharing between non-leaders increases output and lowers equilibrium price of services supplied by the leader.
Savage, Smith and Street (1994)					

Table C.1 (continued) Recent empirical studies of the effect of airline market structure on pricing

Purpose	*Industry and sample*	*Estimation methodology*	*Dependent variable(s)*	*Independent variables*	*Key findings*
Tests the influence of the level of competition on international airfares.	Australian international air routes. Panel data for 40 routes over the period 1983–92. Total of 400 observations for main regressions.	Log-linear two stage least squares regression. First stage a passenger demand equation. Second stage a route specific price equation incorporating a fixed effects procedure to account for unspecified route effects.	*First stage:* Total number of passengers carried on a route by scheduled airlines. *Second stage:* One-way business class fare, economy fare and discount fare available on the route in September (expressed in cents per kilometre).	*First stage:* population of origin and destination cities, average per person income of the origin and destination countries, distance between the origin and destination cities. *Second stage:* competition variable (two separate regressions using firstly the number of airlines, and secondly a Herfindahl–Hirschman index of concentration), fitted passenger variable (from stage one), dummy variables for each route and year. Note: in addition, a standard two stage least squares model was used incorporating a dummy variable for 'regulation' on a route as the competition variable in the demand and price equations.	A negative relationship between competition (as measured by the number of competitors) and the level of discount fares, but not for business and standard economy fares. Discount fares also tend to be lower on liberally regulated routes than non-liberal routes.

Evans and Kessides (1994)

Table C.1 (continued) Recent empirical studies of the effect of airline market structure on pricing

Purpose	*Industry and sample*	*Estimation methodology*	*Dependent variable(s)*	*Independent variables*	*Key findings*
Test the effect of multi-market contact between airlines on pricing behaviour.	US domestic. Panel data for the 1 000 largest city route pairs over the period 1984–88. Total observations 23 055 from 1 266 separate routes and 33 airlines.	Ordinary least squares supplemented by fixed and random effects procedures.	Natural log of average one-way ticket price charged by a airline on a particular route in a given year.	Route market share, airport market share, fraction of direct flight tickets, fraction of round trip tickets, a vector of firm dummy variables, route Herfindahl–Hirschman index based on passenger share, measure of average route contact/measure of average revenue contact (ie contact weighted by route revenue) and time and airline fixed effects.	Fares are higher on routes where the competing carriers have extensive inter-route contacts. Airline airport dominance at endpoint of routes has a highly significant effect on prices.
Evans and Kessides (1993)					
Examines whether dominance in city-pair markets (ie air routes) and airports by single carriers confers them with pricing power.	US domestic. Cross-section data for 1 000 of the most heavily travelled routes in 1988. Total of 4 888 observations with 22 airlines.	Ordinary least squares supplemented by fixed and random effects procedures.	Natural log of average one-way ticket price charged by a airline on a particular route.	Percentage of direct flight tickets, percentage of round trip tickets, airline market share on a route, average of airline's airport market share at route endpoints, and airline dummy variables.	Route dominance not associated with higher average prices but airport dominance is.

Table C.1 (continued) Recent empirical studies of the effect of airline market structure on pricing

Purpose	*Industry and sample*	*Estimation methodology*	*Dependent variable(s)*	*Independent variables*	*Key findings*
Dresner and Tretheway (1992)					
Examine the effect of liberal bilateral air service agreements on airfares.	International. Panel data on 51 uni-directional long-distance (over 4 000km) routes for the years 1976 to 1981.	Log-linear two stage least squares regression. Second stage incorporates a fixed effects procedure to account for unspecified route effects.	*First stage:* Total number of passengers carried by scheduled airlines on a route. *Second stage:* Lowest fare available on the route and the full economy fare.	*First stage:* average population of the origin and destination cities, average income of the origin and destination cities (or countries), great circle distance between the origin and destination cities. *Second stage:* dummy indicating absence of liberal bilateral agreement, predicted passenger volume from stage 1, dummies capturing time and route differences.	The absence of a liberal bilateral agreement has no significant effect on the full economy fare but has a significant and quantitatively important positive impact on discount fares (ie the discount not as great on regulated routes).
Hurdle et al (1989)					

Table C.1 (continued) Recent empirical studies of the effect of airline market structure on pricing

Purpose	*Industry and sample*	*Estimation methodology*	*Dependent variable(s)*	*Independent variables*	*Key findings*
Test the effect of potential entry on an air route on incumbent airline pricing on that route.	US domestic. Cross-section data for 867 city pair routes in 1985.	Four ordinary least squares regressions supplemented by use of non-parametric regression trees.	Average revenue on a city pair per passenger mile.	Distance (log), passenger numbers (log), average plane size, load factor, Herfindahl–Hirschman index of incumbents based on share of available seats, proportion of passengers travelling beyond, measure of likely potential entrants/competitors, Herfindahl–Hirschman index of incumbents and other competitors, commuter presence dummy, proportion of passengers travelling using a single plane, airport slot constraint dummy. (Note: variables vary across four alternative regressions).	Market structure has a bearing on route yields. The most powerful market structure explanatory variables are measures of concentration that include the number and size distribution of incumbents (positive) and number of potential entrants not deterred by economies of scale or scope (negative).

Appendix D Model specification and estimation methodology

This appendix discusses in detail the model specification and estimation methodology underlying the quantitative analysis discussed in chapter 4.

Model specification

The model specification underlying the quantitative analysis is a simple demand and supply market clearing framework in which both quantity and price are jointly determined. The model comprises the following three equations:

$$q^D = \alpha_1 - \beta_1 p + \gamma' X_1 + \mu_1 \quad (1)$$

$$q^S = \alpha_2 + \beta_2 p + \delta' X_2 + \mu_2 \quad (2)$$

$$q^D \equiv q^S \quad (3)$$

where q^D and q^S represent the quantity demanded and supplied, p is equal to price (also endogenous), X_1 and X_2 are the variables exogenous to equations (1) and (2) respectively and μ_1 and μ_2 are the error terms.

Setting the right hand side of equation (1) equal to the right hand side of equation (2) enables a reduced form price equation to be specified. Letting X designate the set of all variables exogenous to the entire system ie $X_1 \cup X_2$, and v_1 a joint error term, enables a reduced form price equation to be written as:

$$p = \varphi_1 + \pi'_1 X + v_1 \quad (4)$$

This reduced form equation is estimated by ordinary least squares as detailed below. A key assumption underlying the specification is that the system is in equilibrium, so that for a given price there is a corresponding market clearing quantity of the product demanded.

Estimation methodology

The estimation methodology utilises several variables contained in the studies discussed in appendix C. Importantly however, it includes variables to test the impact of code sharing, and utilises a single ordinary least squares regression equation. This single equation structure follows logically from the model specified above. In other words, a reduced form price or fare regression equation is estimated containing variables exogenous to both the price and quantity of air travel. The quantity of travel is allowed to vary, and hence the equation estimates the price of air travel under the assumption of market clearing.

The fare or price equation is estimated using the following three different formulations which differ in how code sharing and competition on the route is measured:

$$\begin{aligned}\text{Price}_{it}, = {} & \alpha_0 + \alpha_1\text{POP}_{it} + \alpha_2\text{GDP}_{it} + \alpha_3\text{DIST}_i + \alpha_4\text{CSDUM}_{it} \\ & + \alpha_5\text{AIR2}_{it} + \alpha_6\text{AIR3}_{it}, + \alpha_7\text{BUSAUS}_{it} + \alpha_8\text{BUSFOR}_{it} \\ & + \alpha_9\text{COMPR}_{it} + \alpha_{10}\text{FUEL}_t + \mu_{it}\end{aligned} \quad (1)$$

$$\begin{aligned}\text{Price}_{it}, = {} & \beta_0 + \beta_1\text{POP}_{it} + \beta_2\text{GDP}_{it} + \beta_3\text{DIST}_i + \beta_4\text{CSALL}_{it} \\ & +\beta_5\text{AIR2}_{it} + \beta_6\text{AIR3}_{it}, + \beta_7\text{BUSAUS}_{it} + \beta_8\text{BUSFOR}_{it} \\ & + \beta_9\text{COMPR}_{it} + \beta_{10}\text{FUEL}_t + \varepsilon_{it}\end{aligned} \quad (2)$$

$$\begin{aligned}\text{Price}_{it}, = {} & \psi_0 + \psi_1\text{POP}_{it} + \psi_2\text{GDP}_{it} + \psi_3\text{DIST}_i + \psi_4\text{CSDUM}_{it} \\ & + \psi_5\text{HHI}_{it}, + \psi_6\text{BUSAUS}_{it} + \psi_7\text{BUSFOR}_{it} \\ & + \psi_8\text{COMPR}_{it} + \psi\alpha_9\text{FUEL}_t + \nu_{it}\end{aligned} \quad (3)$$

Price_{it} is alternatively ECONOMY_{it}, the lowest standard return economy airfare offered by any airline(s) over the September quarter, or DISCOUNT_{it} the lowest discount fare offered during the September quarter (after each is weighted for days of availability), for route i =1,2,...,N in year t = 1, 2 ...,T, regressed on the exogenous variables indicated.

It is to be noted that the mean population of the origin and destination cites (POP) and mean GDP per person of the origin and destination countries (GDP) enter the equation as exogenous variables influencing the demand for travel. As they are expected to have a positive effect on passenger demand they should be positively correlated with airfares under the assumption that the demand for travel should rise as population and GDP per person increase.

All the other variables enter the equation as exogenous supply variables and are discussed in detail in chapter 4 and appendix F. The final character in each equation is the error term.

Appendix E City-pair routes used in the quantitative analysis

	Years covered	
City-pair route	*Economy fare regressions*	*Discount fare regressions*
Adelaide–Singapore	1996	1996
Brisbane–Auckland	1992–1996	1992–1996
Brisbane–Bangkok	1996	1996
Brisbane–Christchurch	1992–1996	1992–1996
Brisbane–Hong Kong	1993–1996	1993–1996
Brisbane–Honiara	1992–1996	1993–1995
Brisbane–Kuala Lumpur	1996	1996
Brisbane–Nadi	1992–1996	1992–1996
Brisbane–Noumea	1992–1996	1992–1994, 1996
Brisbane–Port Vila	1992–1996	1992–1995
Brisbane–Port–Moresby	1992–1996	1992–1996
Brisbane–Singapore	1992–1996	1992–1996
Brisbane–Tokyo	1996	1996
Brisbane–Wellington	1992–1996	1992–1996
Cairns–Auckland	1992–1996	1992–1996
Cairns–Fukuoka	1992–1996	1992–1996
Cairns–Mt Hagen	1993–1996	1992–1995
Cairns–Port Moresby	1992–1996	1992–1996
Cairns–Sapparo	1993–1996	1993–1996
Cairns–Singapore	1992–1996	1992–1994, 1996
Darwin–Denpasar	1993–1996	1993–1996
Hobart–Auckland	1996	1996
Melbourne–Auckland	1992–1996	1992–1996
Melbourne–Christchurch	1992–1996	1992–1996
Melbourne–Denpassar	1993–1996	1993–1996
Melbourne–Hong Kong	1994–1996	1994–1996
Melbourne–Mauritius	1996	1996
Melbourne–Nadi	1992–1996	1992–1996

	Years covered	
City-pair route	*Economy fare regressions*	*Discount fare regressions*
Melbourne–Noumea	1992–1996	1992–1994, 1996
Melbourne–Port Vila	1995–1996	1995–1996
Melbourne–Singapore	1992–1996	1992–1996
Melbourne–Wellington	1992–1996	1992–1996
Perth–Auckland	1992–1996	1992–1996
Perth–Bandar Seri Begawan	1992–1996	1992–1996
Perth–Bangkok	1992–1996	1992–1996
Perth–Denpassar	1992–1996	1992–1996
Perth–Hong Kong	1992–1996	1992–1996
Perth–Jakarta	1993–1996	1993–1996
Perth–Kuala Lumpar	1992–1996	1992–1996
Perth–Singapore	1992–1996	1992–1996
Perth–Tokyo	1992–1996	1992–1996
Port Hedland–Denpassar	1992–1993, 1995–1996	1992–1993
Sydney–Auckland	1992–1996	1992–1996
Sydney–Beijing	1995–1996	1995–1996
Sydney–Christchurch	1992–1996	1992–1996
Sydney–Denpassar	1993–1996	1993–1996
Sydney–Hong Kong	1992–1996	1992–1996
Sydney–Jakarta	1996	1996
Sydney–Kuala Lumpur	1995–1996	1995–1996
Sydney–Los Angeles	1992–1996	1992–1996
Sydney–Manila	1992, 1994, 1996	1992, 1994, 1996
Sydney–Nadi	1992–1996	1992–1996
Sydney–Noumea	1992–1996	1992–1996
Sydney–Port Vila	1992–1996	1992–1995
Sydney–San Fransisco	1994–1996	1994, 1996
Sydney–Seoul	1992–1996	1992–1996
Sydney–Singapore	1992–1996	1992–1996
Sydney–Taipei	1992–1996	1992–1996
Sydney–Tokyo	1992–1996	1992–1996
Sydney–Wellington	1992–1996	1992–1996

Appendix F Data and derivation of variables

This appendix explains the derivation of variables and sources of data for the quantitative analysis presented in chapter 4.

The number of routes into and out of Australia amounts to several hundred when different stopover points are taken into account. For the purposes of the quantitative analysis, this presented a problem in the amount of information that would need to be compiled for each route. More importantly, data on seat allocations and passenger movements on routes with stop-overs are not broken down by section. As a result, it is not possible to determine what proportion of passengers travel the full distance or embark or disembark at intermediate points.

For these reasons, the sample was restricted to the direct city-pair routes into and out of Australia. In 1996, these numbered 68 routes based on Department of Transport Regional Development (DTRD) documentation (DTRD 1996c). The sample did not contain any European or other very long routes. Therefore, the sample is somewhat oriented towards the Asia–Pacific region. In 1996, there were code sharing arrangements on 22 of these routes.

Sample data was compiled between 1992 and 1996 for each city-pair route where data permitted (note that not all routes existed over the five years). Due to various data limitations, the final sample comprised 60 routes totalling 248 observations for the economy fares regressions and 239 observations for the discount fares regressions. A cursory review of the routes, both with and without code sharing, indicates that they cover a broad range of destinations to both developing and developed countries as well as predominantly leisure and non-leisure destinations. The routes are listed in appendix E.

The variables used, the reasons for inclusion and the data sources used are detailed as follows:

ECONOMY$_{it}$ The lowest real \$A standard return economy airfare offered by any particular airline(s) on route *i* in the September quarter of year *t*. The lowest fare is derived by weighing each airline's fare over the course of the September quarter by the number of days of availability. For example, if Qantas offers a return airfare on the Sydney–Auckland route of \$400 for 30 days of the quarter and a fare of \$420 for the remaining 62 days of the quarter, its fare will be calculated as \$400×30/92+\$420×62/92=\$413. After repeating this for each airline, the lowest of these fares is taken as the fare for the route. However, the standard published economy fare generally does not differ by airline and tends to be the same across the quarter. The fare is converted into 1992 dollars by deflating by the Australian consumer price index. This methodology follows that of the BTCE (1996c) in estimating demand elasticities of air travel into and out of Australia. This fare class is designed to capture the extent to which airlines compete for general economy traffic, be it visiting friends and relatives, leisure or business. No separate business class airfare is included, as the consensus in the literature seems to be that airlines do not compete heavily on the basis of price for this segment of the market. The variable is utilised as an endogenous variable in the regression equation. The fares data was obtained from September editions of the publication *Worldwide Fares* (Air Tariff Publications, various years). Fares data was not available for any years for the city-pair markets Brisbane–Hamilton, Brisbane–Nauru, Christmas Island–Jakarta, Darwin–Ambon, Darwin–Kupang, Melbourne–Hamilton, Sydney–Guam and Sydney–Hamilton.

$DISCOUNT_{it}$ The lowest real $A discount return economy airfare offered by any particular airline(s) on route *i* in the September quarter of year *t*. The lowest fare is derived by weighing each airline's fare over the course of the September quarter by the number of days of availability by the same methodology detailed above. The use of a discount fare is designed to capture the degree of competition for the most price sensitive leisure traffic following Savage, Smith and Street (1994) and Dresner and Tretheway (1992). The variable is utilised as an alternative endogenous variable. This fare also rarely differed between airlines on a route. However there were frequently different fares for different periods of the quarter. This data was also obtained from monthly editions of the publication *Worldwide Fares*.

POP_{it} The mean population (in thousands) of the origin and destination cities for route *i* in year *t*. Population of the origin and destination cities is assumed to have a positive effect on passenger demand on a route (Dresner and Tretheway 1992). Data for Australian capital cities were obtained from the ABS (1996) *Year Book.* Figures for non-capitals were obtained from the relevant ABS state year book. Population estimates for most foreign cities were obtained from the United Nations' (UN) (1995) *Statistical Yearbook*, which contains population figures for the largest city in each country. In most cases the 1995 figure was used and extrapolated to other years using the average annual growth rates provided in the same publication. Where data was required for cities other than the largest in the country, other sources used were the *Times World Atlas* (Times 1992) and Europa (1992). These publications generally gave 1991 population figures, from which estimates were derived for other years using the UN growth rates for the urban population of the country concerned.

GDP_{it} The mean constant price GDP per person (in $A) of the countries in which the origin and destination cities of route *i* are located, in year *t*. Other studies (Dresner and Tretheway 1992, Savage, Smith and Street 1994) used the average income per person of the origin and destination cities as an explanatory variable of the demand for travel. Where this was not available, they used average income per person for the relevant state or country. The limited data for cities, particularly for recent years made the use of data other than that for countries difficult for the current study. As data for *real* GDP per person is only readily available to about 1993, it was necessary to construct a series from a number of sources and employ forecasts for later years. Figures for GDP in $US in 1992 were obtained from the UN (1995) and real growth rates for 1993 to 1995 and growth forecasts for 1996 applied as calculated by the IMF (1996) in its publication *World Economic Outlook.* These figures were then converted to Australian dollars by applying the average $A/$US exchange rate for 1992 published in IMF's *International Financial Statistics* (IMF 1997). Population data for countries was also taken from IMF (1997) which is one of the most up-to-date individual sources of long time series data (but in many cases still only containing data up to 1995). For later years, data on real GDP growth rates and population estimates supplied by the Department of Foreign Affairs or Europa (1992) and the ABS (1995) (for Australia), and/or estimations based on past growth performance were used where information was not available from the pervious sources. The $A GDP figures were divided by population to obtain the per person estimates.

$DIST_i$ The shortest one-way great circle distance in kilometres between the origin and destination cities of route *i*. For example, the shortest distance between Sydney and Auckland as measured over the earth's surface. Distance is assumed to be a key determinant of the cost of supply of travel following Oum Park and Zhang (1996) and Hurdle et al (1989). Other authors incorporate distance into their analysis as a key determinant of the demand for travel. Savage, Smith and Street (1994) associate greater distances with lower demand due to the likely higher cost and time of travel. Dresner and Tretheway (1992) associate greater distances with higher demand for air travel due to the absence of alternative modes of transport. In the Australian context, its influence on cost is expected to be paramount due to the overwhelming dominance of air travel as a means of getting to and from Australia and the likely greater importance of factors such as trade links, ethnic origin and locational features in governing the demand for travel to particular destinations. This data is sourced from the Department of Transport and Communications (1992) *Australian Air Distances.*

$CSDUM_{it}$ Dummy variable indicating the presence of one or more parallel code sharing arrangements on route *i* in the September quarter of year *t*. It has been suggested that parallel code sharing may enable airlines to supply their output more cheaply and compete more vigorously and thus produce lower fares. On the other hand they may provide a means for airlines to exercise market power by reducing competition on a route. Due to these opposing forces, the expected sign of the variable is uncertain. A shortcoming of this variable is that it does not indicate the degree of code sharing, which the next code sharing variable attempts to do. The data was supplied by DTRD.

$CSALL_{it}$ Number of code shared flights per week offered by airlines actually operating flights on route *i* divided by the flights of all airlines operating on route *i*, plus the number of code shared flights per week offered by airlines not actually flying on route *i* divided by the flights of all airlines actually operating flights on route *i* (all in respect to the September quarter of year *t)*. For example, if Air New Zealand has a code sharing agreement with Qantas for 5 flights per week on the Sydney–Auckland route and both airlines operate flights totalling 10 flights per week on the route, as well as being the only two airlines servicing the route, this variable will have a value of 0.5. If there was also another airline which code shared on two of the flights of one of these airlines, but did not operate flights on the route itself, the variable would equal 0.7. Note that it is possible for the variable to exceed 1 where there is more than one arrangement per flight. This variable is used as an alternative to the code sharing dummy variable above. The data was supplied by the DTRD.

$AIR2_{it}$ and **$AIR3_{it}$** Dummy variables indicating the presence, respectively of two and three or more airlines on route *i* in the September quarter of year *t*. It should be noted that there was only one case where the number of airlines on the route was greater than three. In this instance there were four airlines. The variables take the value of 1 when the respective number of airlines exist and 0 otherwise. Hence it indicates how fares differ compared to the case when there is only a single airline. This variable was used by Savage, Smith and Street (1994) as an indication of the amount of competition on a route. It is expected that the greater the number of airlines, the greater the amount of competition between them for passengers and the airfare offered will in turn be lower. The data was supplied by the DTRD. In certain cases, no route airlines were listed as operating during the quarter, resulting in elimination of the route from the sample.

HHI_{it} Used as an alternative variable to AIR2 and AIR3, this variable comprises a Herfindahl–Hirschman index of route concentration, calculated by summing the squared seat shares of the different airlines operating services on route *i* in the September quarter of year *t*. For example if there is only one airline operating on a route, the index will take the value of 1^2=1. If there are two airlines operating on the route, with equal seat shares it will take the value of $0.5^2+0.5^2=0.5$. In other words, as the number of players increases and the share of each falls the index approaches zero. This variable was employed by Savage, Smith and Street (1994) and variations of it by Evans and Kessides (1994) and Hurdle et al (1989). Given that market concentration is believed to increase the ability to raise prices, a positive relationship is expected to be observed between this variable and airfares. The index is constructed using airline numbers and seat shares supplied by the DTRD.

BUSAUS$_{it}$ Resident departures for business purposes travelling to the country in which the destination city of route *i* is located, expressed as a proportion of total departures to that country during year *t*. The variable is designed to capture differences in pricing that may be accounted for by variations in the proportion of business passengers. It tests whether a higher proportion of business travellers has a tendency to cause other airfares on the route to be higher. It is reasoned that the higher the proportion of business travellers the more likely that airlines will seek to offer higher yielding business class seats and also not wish to offer or compete for low economy or discount fares on the basis that price sensitive business traveller may seek to travel economy class instead. Hence the sign of this variable is expected to be positive. Data was supplied by the DTRD.

BUSFOR$_{it}$ Foreign arrivals to Australia for business purposes travelling from the country in which the origin city of route *i* is located, expressed as a proportion of total arrivals from that country during year *t*. The rationale for including this variable is broadly the same as the previous one, along with attempting to see if there is any difference in effect of the foreign inbound market having different proportions of passenger types. Data was supplied by the DTRD.

COMPR$_{it}$ The number of alternative routes which pass through the origin and destination cities of route *i* during the September quarter of year *t*. Alternative routes include those which begin in route *i*'s origin city and have an intermediate stop at route *i*'s destination city, and routes which begin and terminate at the same city pairs as route *i*, but have one or more stops in between. With respect to the Sydney–Auckland route, an example of the former would be a return service from Sydney to Los Angeles via Auckland. An example of the latter would be a service that operates from Sydney to Auckland via Brisbane. Given that the analysis deals only with direct routes, this variable aims to capture the main substitution possibilities for the route, and to account for an element of competition and contestability that the other competition related variables may not capture. It is expected to have a negative influence on airfares. This information was supplied by DTRD.

$FUEL_t$ The average real spot wholesale price of US aviation fuel in \$A per litre in year *t*. This variable is designed to capture one of the main operating costs of aircraft, and is expected to be an important influence on airfares over time. The nominal \$US fuel price series was obtained from the January 1997 edition of *The Avmark Aviation Economist.* This was converted into \$A by applying the average annual \$A/\$US exchange rates from the IMF (1997) and converted into real terms by deflating the series by the average GDP deflator for industrial countries published by the IMF (1996).

Appendix G Detailed results of quantitative analysis

Descriptive statistics for all variables included in the regression are provided in table G.1 below. These statistics (except the discount fare) are based on the data available for the regression equation for economy fares. The statistical package used for the quantitative analysis was White's (1993) *Shazam, Version 7.0.*

Table G.1 Descriptive statistics

Variable	*Unit*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
$ECONOMY_{it}$	$A	2 266.9	1 159.0	676.1	5678.0
$DISCOUNT_{it}$ *	$A	929.6	380.8	338.0	2 436.8
POP_{it}	'000 persons	2 895.0	3 121.3	31.1	15 390
GDP_{it}	$A	20 009.0	6 197.4	11 849.0	33 630.0
$DIST_{i}$	Km	4 364.3	2 547.2	841.0	12 065.0
$CSDUM_{it}$	Dummy	0.41	—	—	—
$CSALL_{it}$	Ratio	0.36	0.46	0.00	1.50
$AIR2_{it}$	Dummy	0.33	—	—	—
$AIR3_{it}$	Dummy	0.06	—	—	—
HHI_{it}	Index 0–1	0.82	0.23	0.33	1.00
$BUSAUST_{it}$	Ratio	0.21	0.09	0.05	0.43
$BUSFOR_{it}$	Ratio	0.10	0.05	0.02	0.38
$COMPR_{it}$	Number	2.3	2.9	0.0	16.0
$FUEL_{t}$	$A per litre	0.19	0.02	0.17	0.21

* Indicates statistics based on a sample of 239 observations, rather than 248 observations.

Some key observations to be gleaned from the descriptive statistics are that the average discount fare is less than half that of the average economy fare. Code sharing was present on 41 per cent of routes, and on average the number of flights code shared as a proportion of all route flights was 36 per cent. Around 60 per cent of routes had only a single airline operating, 33 per cent two airlines and the remainder had three or more airlines operating services.

Average route concentration was quite high as indicated by the average HHI figure of 0.81.

The reduced form regression results are presented in table G.2. The first two regression equations for each fare class differ in the way code sharing is modelled (see columns (1) and (2) under each fare class). In the first regression (column (1)), the presence of a code sharing arrangement is indicated by a dummy variable. In the second regression (column (2)), the level of code sharing is measured as the number of code shared flights operated as a proportion of the number of route flights. The third regression (column (3) in table G.2) is similar to the first, the difference being that airline concentration on a route is measured by a Hirschman–Herfindahl index rather than by the use of dummies indicating the number of airlines.

The regressions exhibit a very good fit, having very high adjusted R^2s (0.95 for the economy fare and 0.87 for the discount fare regressions) and low standard errors in each case.

Table G.2 Reduced form regression results

Exogenous variables	*Endogenous variables*					
	ECONOMY $_{it}$			DISCOUNT $_{it}$		
	(1)	*(2)*	*(3)*	*(1)*	*(2)*	*(3)*
Constant	**748.1**	**760.5**	**827.9**	*193.5*	*200.30*	145.1
	(3.577)	**(3.615)**	**(3.881)**	*(1.66)*	*(1.708)*	(1.227)
POP $_{it}$	-0.0007	-0.0010	-0.0018	**0.0113**	**0.0113**	**0.0108**
	(-0.095)	(-0.138)	(-0.265)	**(2.843)**	**(2.851)**	**(2.848)**
GDP $_{it}$	**-0.0118**	**-0.0117**	**-0.0121**	**-0.0047**	**-0.0045**	**-0.0046**
	(-3.639)	**(-3.589)**	**(-3.709)**	**(-2.57)**	**(-2.455)**	**(-2.543)**
DIST $_{i}$	**0.4313**	**0.4311**	**0.4312**	**0.1369**	**0.1359**	**0.1373**
	(44.63)	**(44.26)**	**(44.69)**	**(25.4)**	**(25.03)**	**(25.56)**
CSDUM $_{it}$	**-235.1**	—	**-235.9**	34.3	—	34.5
	(-6.042)		**(-6.055)**	(1.579)		(1.589)
CSALL $_{it}$	—	**-252.6**	—	—	17.4	—
		(-5.823)			(0.715)	
AIR2 $_{it}$	51.9	31.20	—	-24.20	-22.64	—
	(1.448)	(0.862)		(-1.217)	(-1.128)	
AIR3 $_{it}$	-4.3	-33.08	—	-34.26	-31.86	—
	(-0.057)	(-0.436)		(-0.832)	(-0.769)	
HHI $_{it}$	—	—	-60.3	—	—	39.8
			(-0.837)			(0.998)
BUSAUST $_{it}$	-124.4	-205.97	-138.8	*207.1*	*197.07*	*208.6*
	(-0.620)	(-1.007)	(-0.692)	*(1.816)*	*(1.693)*	*(1.833)*
BUSFOR $_{it}$	**-3874.9**	**-3934.9**	**-3861.2**	**-1000.9**	**-938.4**	**-996.4**
	(-11.19)	**(-11.38)**	**(-11.15)**	**(-5.191)**	**(-4.875)**	**(-5.177)**
COMPR $_{it}$	3.7	2.44	4.7	**-7.61**	**-8.0**	**-7.9**
	(0.62)	(0.401)	(0.789)	**(-2.298)**	**(-2.395)**	**(-2.409)**
FUEL $_{t}$	*1963.3*	**2050.5**	*1934.0*	**1411.4**	**1399.7**	**1432.7**
	(1.934)	**(2.01)**	*(1.904)*	**(2.504)**	**(2.473)**	**(2.544)**
N	248	248	248	239	239	239
R^2 adjusted	0.95	0.95	0.95	0.87	0.87	0.87
SEE	253.5	254.7	253.7	138.3	138.9	138.3
Mean dep. var.	2266.9	2266.9	2266.9	929.6	929.6	929.6
RESET(2)	0.506	0.007	0.642	14.227	14.969	14.475

Notes : Figures in brackets are t-ratios.

Bold text indicates significance of the estimated coefficient at the 5 per cent (two sided) level or less.

Italicised text indicates significance at less than 10 per cent but above 5 per cent (two sided test).