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**THE SUPPLY OF AIR FREIGHT  
CAPACITY TO ASIAN MARKETS**

Commonwealth of Australia 2000

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## **FOREWORD**

The financial crisis, which struck the Asian region in 1997, had many profound and far-reaching consequences for both the countries involved and the world as a whole. This study examines one aspect of the impact of the crisis on Australia—the adequacy of the air freight network to carry Australian exports to Asian markets.

Air freight exports are predominantly carried in the belly-holds of passenger aircraft. This study examines the contraction in passenger markets resulting from the financial crisis and analyses the implications for air freight exports. It also examines the demand for Australian air exports and constructs an air freight supply and demand scenario for twelve Asian countries.

The study was completed for the Cross-Modal & Maritime Transport Division of the Department of Transport and Regional Services in response to questions raised by the Transport and Logistics Working Group of the Supermarket to Asia Council concerning perceptions of the availability of export air freight capacity to Asian markets.

The study team comprised David Smith (project leader), Sharyn Kierce and Alistair Nitz. The team would like to thank the International Aviation and Cross-Modal Transport branches of the Department of Transport and Regional Services, Qantas, Singapore Airlines and State Air Freight Councils who provided valuable comments. The team also acknowledges the editorial contributions of Joe Motha, particularly in the final stages of the study.

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Deputy Executive Director

Bureau of Transport Economics  
Canberra  
March 2000



**The data analyses contained in this study were completed in August 1999. The analyses used the most recent data available (1998) to construct scenarios for 1999 and 2000. The scenario analyses reflect the outlook for the aviation freight industry from the middle of 1999 to 2000.**

**Events occurring after August 1999 (such as the crisis in East Timor and airline schedule changes in particular countries) that may have affected air freight supply and demand in Asian markets are not taken into account in this study.**

**Actual demand and supply data for 1999 are not expected to be available until mid-2000.**





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## **EXECUTIVE SUMMARY**

How did the financial crisis of 1997-99, which originated in the Asian region, affect the supply of air freight capacity for Australian exports to Asian markets? Did the contraction in passenger markets (and therefore also belly-hold cargo capacity) leave Australian exporters without adequate air freight access to these markets? What is the outlook for the near-term future?

These are the key questions addressed in this study.

The data analyses in this study were completed in August 1999. The analyses used the most recent data available (1998) to examine the impact of the crisis and to construct scenarios for 1999 and 2000. The scenario analyses reflect the outlook for the aviation freight industry from the middle of 1999 to 2000.

The study focused on twelve Asian markets—Hong Kong, Japan, Singapore, China, Indonesia, South Korea, Malaysia, Philippines, Taiwan, Thailand, India and Vietnam.

Export air freight capacity to Asian destinations is predominantly provided in the belly-holds of passenger aircraft. The aggregate supply of capacity to Asian markets is therefore likely to remain subject to the ebb and flow of passenger transport demand. While the financial crisis caused a significant contraction in passenger demand, it appears that most Asian markets are recovering quickly.

An economic analysis of belly-hold versus dedicated freight reveals that most Australian freight is carried in passenger aircraft because it is cheaper for exporters and profitable for airlines. Passengers generally yield greater revenue than freight, and in most instances the operation of dedicated freighters out of Australia is not economically viable. Revenues from passengers easily cover costs on combination aircraft, allowing flexible pricing of belly-hold capacity.

## **DETAILS OF THE ANALYTICAL APPROACH**

The approach taken was to:

- Ascertain the demand for air freight capacity from Australia in 1998. The recent development and current profile of Australian exports were examined for each of the twelve Asian countries.
- Determine the amount of air freight capacity provided over this period and identify whether there were any pressures evident. Capacity was measured using weight (tonnes) because, although some commodities may face volume constraints, airlines advised that weight was the crucial factor in aircraft loading

decisions. The amount of 'guaranteed' cargo capacity was used (the weight capacity remaining after allowing for 100 per cent passenger loading and required trip fuel). This capacity represents the minimum available.

- Project the future level of air freight capacity supply and demand to identify whether there is any likelihood of emerging pressures. The approach involved developing a scenario for how the supply of flights and the demand for cargo space might unfold in 1999 and 2000. The purpose of scenario modelling was not to accurately estimate any emerging or future misalignment, but to identify the markets in which pressures might be likely.

### **Future demand**

The approach used in projecting future demand was to use correlations between changes in economic growth rates and export growth rates (and/or magnitude of exports), as a basis for projecting 1999 and 2000 export volumes. The approach involved several decisions and assumptions:

- It was assumed that the modal shares of export commodities do not change in the short term.
- 'Food' and 'other' export commodity groups were forecast separately, using information from Supermarket to Asia Council and International Monetary Fund GDP forecasts.
- The 'food' category included only food commodity groups that comprised the top 15 in quantity in 1998. Lower volume food exports are included in the residual 'other' category.

### **Future supply**

Projecting future supply involved analysing passenger market composition (Australian and foreign travellers) over time, the effect of the crisis on the market and the comparative proportions of origin–destination (OD) and uplift–discharge (UD) traffic. This, together with an assessment of how the supply of seats changed during 1998, provided a basis for a scenario projection on the supply of seats, and therefore cargo capacity, in 1999 and 2000.

Key assumptions underlying the analysis were that:

- all the Asian markets are predominantly passenger markets, with the majority of cargo capacity carried in the belly-holds of passenger aircraft; and
- the supply of seats approximately correlates with the supply of cargo space.

Scenario projections of air freight capacity supply and demand were then compared to determine whether pressures might arise in the near future.

## **FINDINGS**

Using the measure of 'guaranteed' cargo capacity, it was found that, although some exporters may have faced constraints in obtaining cargo space on their preferred

scheduled services, no significant overall capacity problems occurred in 1998. However, seasonal pressures appeared to exist in 1998 for Hong Kong, Japan, China, Taiwan and Vietnam. For example, there is a difference of about 6000 tonnes in exports to Hong Kong between the first and third quarters of each year. The *fresh fruit* commodity group is largely responsible for this, with demand peaking sharply in the first quarter of each year, during which 40 to 50 per cent of the annual volume is freighted. Other markets show similar seasonality trends with commodities such as fresh vegetables and seafood.

The scenarios developed for 1999 and 2000 also did not identify any overall capacity pressures, except in the case of Vietnam. However, for some markets, the seasonal pressures appearing in 1998 are likely to persist in 1999 and 2000. Overall, capacity pressures are not expected to occur in the next few years.

This study provides a sensible starting point and a solid base from which to pursue more detailed analyses of the Australian export air freight industry. Possible directions for further work include an investigation of pressures on the air freight system in each State/Territory and an examination of the adequacy of domestic transport links within Australia.



## **INTRODUCTION**

### **BACKGROUND**

Air transport, of all the modes (road, rail, air and sea), is the most expensive to operate per kilogram of mass carried. This means that commercial air transport is predominantly offered to the high value/high yield end of the market—people (business and non-business travellers) and time-critical freight (overnight documents and high value/highly perishable items).

Air transport linkages between Australia and the rest of the world are dominated by passenger aircraft flights serving a market for personal travel and carrying freight as a secondary product. There are some dedicated freighters operating on particular routes in and out of Australia; however, for the majority of overseas destinations most of the cargo space is provided by passenger aircraft. Consequently, Australian commodity exporters requiring air transport have to source cargo capacity in a transport market essentially determined in size by levels of passenger demand.

Such a situation begs the question: to what extent are changes (growth/decline) in a country's demand for Australian exports related to changes in the size of the passenger market between the two countries? In other words, if a passenger market were to contract suddenly, taking with it a large number of passenger flights (and thereby a large part of the total cargo capacity on offer) would this leave Australian exporters without adequate air freight access to the market?

This question has been raised in the context of the recent financial crisis that originated in Asia. Some airlines have ceased operations; others have substantially contracted their networks; and yet others, such as Qantas, have re-positioned their networks and their short-term future growth plans away from Asia towards Europe and the Americas. The upshot of these changes has been a general contraction in the number of passenger flights between Australia and some of its Asian neighbours.

But how has this contraction in passenger flights affected the amount of available cargo space? Has the demand for Australian exports also declined as a result of contracting economies? What is the outlook for the future? If the demand for Australian exports has fallen, will it recover at a faster or slower rate than the demand for passenger services? Will there be a lag in airlines committing to the recovery of passenger markets? These are valid questions and clearly of interest to Australian exporters to Asia. The purpose of this study is to address such questions.

## **AIM, SCOPE AND METHODOLOGY**

Whether the air transport industry is providing adequate or sufficient air cargo space for Australian exporters to Asia is a multi-layered question. At the lowest level of detail, a farmer might pick produce on a particular night of the week, pack and ship it to the nearest international airport and require, say, three tonnes of cargo space on a flight departing the next morning for Malaysia. If this opportunity is unavailable, the farmer may view the supply of air freight as inadequate for his needs. At the highest level of detail, it would be possible to examine whether the longer term demand for cargo space approached or exceeded its supply.

This study has been conducted at a relatively higher level of detail; metaphorically, it aims to peel off and examine the outermost layer of the multi-layered question concerning the adequacy of export air freight capacity. Firstly, the recent development and current profile of Australian exports are examined for each of twelve Asian countries that are of interest to the Prime Minister's 'Supermarket to Asia' Council. Next, the adequacy of supply of freight capacity on passenger and dedicated freighter aircraft from Australia to these twelve markets for the four quarters of 1998 is assessed. This assessment demonstrates the extent to which exports used available freight capacity. It also sheds some light on how airlines modified their supply of flights (and resulting cargo space) in response to the recent financial crisis.

Finally, the question of the adequacy of freight capacity in the future is addressed by developing a scenario for how the supply of flights and the demand for cargo space might unfold in 1999 and 2000. The purpose of this scenario modelling is not to accurately estimate any emerging or future misalignment, but to identify the markets in which pressures might be emerging.

## **PURPOSE**

This study is intended to provide information on the issue of the adequacy of export air freight capacity. The information presented is intended to stimulate discussion among those interested in the issue including export producers, freight forwarders, airlines, industry peak bodies and various levels of government.

## **STRUCTURE OF THE STUDY**

There are three parts to the study.

Part A sets the scene. It illustrates Australia's commodity export profile, working from the big picture of all Australian commodity exports by all modes, through commodity exports by air, and concludes with commodity exports by air to Asia.

Part B is the analytical core of the study. The research framework is used to examine the twelve Asian markets and to assess the historical and future adequacy of supply of air freight capacity. The third part, the appendixes, provide information on the economics of airline operations (passenger versus freight), dedicated freighters serving the Australian market and the role and influence of Government.

Information is also provided on current views about the future of air freight, the financial crisis and the mathematics of estimating queuing delay in airline flight systems.





## PART A—OVERVIEW OF AUSTRALIAN AIR FREIGHT EXPORTS

Australia exports hundreds of millions of tonnes of commodities each year. These commodities, collectively worth tens of billions of dollars, go by air and sea transport to destinations all over the world.

The focus of this study, however, is on air freight to Asia<sup>1</sup>. This is a small subset of total commodity exports. The purpose of this part of the study is to put 'exports to Asia by air' into context. This is done by progressively narrowing down the export profile, firstly by transport mode, then by destination. The following section starts the process by looking at the total export profile.

### AUSTRALIAN COMMODITY EXPORTS: THE BIG PICTURE

This section discusses the profile of total exports by air and sea.

#### The 'top ten' exports

In both 1997 and 1998, Australia's two primary classes of export commodities (by quantity) were *coal, coke and briquettes* and *metalliferous ores & metal scrap*. Together, these accounted for 74 per cent (316 million tonnes) of all commodity exports in 1998. Table 1 shows the top ten exports by weight in 1997 and 1998 (in descending order of quantity exported based on 1998 data).

**TABLE 1 TOP TEN COMMODITY EXPORTS (BY WEIGHT)—1997 AND 1998**

	1997	1998
	(tonnes)	
Coal, coke & briquettes	158 006 697	162 268 793
Metalliferous ores & metal scrap	178 642 850	154 070 270
Other commodities & transactions	9 183 684	43 994 945
Cereals & cereal preparations	24 590 063	18 063 654
Petroleum & petroleum products	15 330 828	15 816 192
Cork & wood	7 940 436	8 046 568
Crude fertilisers & crude minerals	12 662 489	5 229 763
Iron & steel	3 458 562	3 637 338
Non-ferrous metals	2 104 704	2 193 060
Gases, natural & manufactured	1 484 463	1 434 399
Others	17 128 024	24 457 096
Total	430 532 800	427 650 466

*Note* The order of the 'top 10' is based on 1998 data.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

<sup>1</sup> The terms 'air freight', 'air cargo', 'space' and 'capacity' are used interchangeably throughout this study.

By value, the story is somewhat different (table 2). *Gold, non-monetary* makes it into the top ten by value, and *coal, coke and briquettes* and *metalliferous ores & metal scrap* stay near the top because their substantial export volumes more than compensate for low value per unit of weight. Two food commodity groups, *meat and meat preparations* and *dairy products and birds eggs* enter the list of top ten by value. While the quantity of Australian commodity exports declined slightly in 1998 (table 1), the total value of these exports increased by 6.7 per cent from (\$85.4 to \$91.2 billion).

**TABLE 2 TOP TEN COMMODITY EXPORTS (BY VALUE)—1997 AND 1998**

	1997	1998
	(\$ million)	
Other commodities & transactions	4 335	16 758
Coal, coke & briquettes	8 817	9 564
Metalliferous ores & metal scrap	9 785	7 842
Gold, non-monetary	4 923	7 641
Non-ferrous metals	4 917	5 127
Textile fibres	5 217	4 255
Meat & meat preparations	3 437	3 907
Petroleum & petroleum products	3 555	2 940
Dairy products & birds eggs	1 787	2 100
Road vehicles	1 867	1 861
Others	36 809	29 218
Total	85 449	91 215

*Note* The order of the 'top 10' is based on 1998 data.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

### Exports by transport mode

Not surprisingly, the vast bulk of both exports and imports are carried by sea—a result of the relative cost economies of the two transport modes. Nonetheless, a significant amount of freight (in absolute, rather than relative terms) is carried by air. These tend to be the time-sensitive commodities (usually due to perishability) and tend to have a relatively higher value per unit weight. In 1998, Australia exported 302.6 thousand tonnes (or 0.07 per cent) of total exports by air.

However, in terms of value, this air freight was worth \$21.4 billion dollars, or 24 per cent of the total value of all commodity exports. The calculation of a simple average value per kilogram of exports reveals the magnitude of difference in the value by weight of the commodities exported by air and sea. In 1998, air exports were worth an average of \$71 per kilogram, whereas sea exports were worth around 16 cents per kilogram.

Table 3 compares the weight and value of commodity exports by mode in 1997 and 1998.

TABLE 3 AUSTRALIAN COMMODITY EXPORTS BY MODE—1997 AND 1998

		1997		1998	
		Quantity (tonnes)	Value (\$ million)	Quantity (tonnes)	Value (\$ million)
Exports	Air freight	322 048	17 177	302 568	21 441
	Sea freight	430 210 752	68 272	427 347 898	69 774
	Total	430 532 800	85 449	427 650 466	91 215

Source BTE analysis of ABS International Cargo Statistics (unpublished).

## COMMODITY EXPORTS BY AIR

The following discussion relates to Australian air freight exports in 1998.

### Major export commodity groups

Australia exported 64 different commodity groups by air in 1998 based on the two-digit commodity group codes of the Australian Bureau of Statistics (ABS). The diverse range of commodities included food groups (such as *dairy products and birds eggs*), manufactures (such as *photographic equipment, optical goods and watches*) and raw materials (such as *crude fertilisers and crude minerals*).

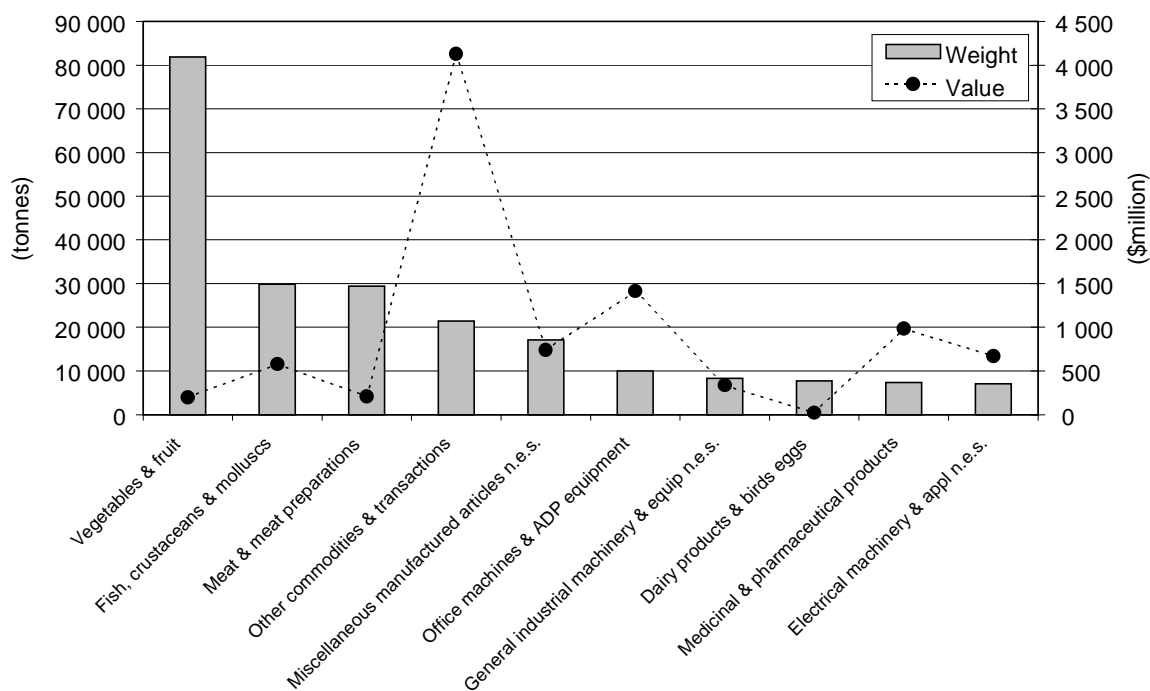
By far the largest group in terms of quantity (weight) was *vegetables and fruit*, which at 81.8 thousand tonnes, comprised 27 per cent of the total. If the next two largest commodity groups, *fish, crustaceans & molluscs* and *meat & meat preparations* are added, these three together account for just under half (47 per cent) of the total weight of air freight exports.

In terms of the value of exports, *gold, non monetary* heads the list at \$7.6 billion (36 per cent of the total). The next clear category to emerge is *office machines and automatic data processing (ADP) equipment* which, with a value of \$1.4 billion, makes up 6.6 per cent of the total.

Figure 1 shows the top ten commodity groups exported by air in 1998 in terms of weight (bars) and value (dots). Figure 2 presents the same information by value (bars) and weight (dots).

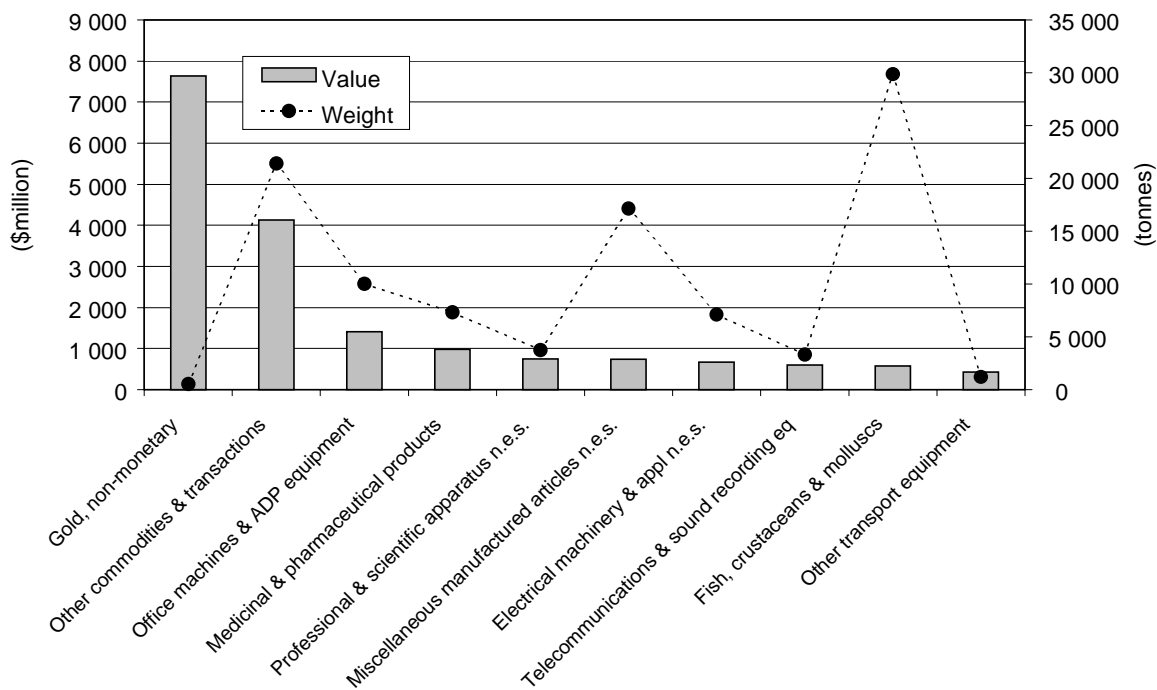
Figure 1 reveals that while *vegetables and fruit* are by far the largest commodity group in quantity terms, it is comparatively low in value compared with some other exports such as *office machines and ADP equipment* and *medicinal and pharmaceutical products*. Of the 'top-ten' export food groups, *vegetables and fruit* is of lowest value at approximately \$2.40 per kilogram, while *fish, crustaceans and molluscs* is of highest value at approximately \$19.30 per kilogram.

**FIGURE 1 TOP TEN COMMODITIES EXPORTED BY AIR, BY WEIGHT AND VALUE—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

**FIGURE 2 TOP TEN EXPORT COMMODITIES BY AIR, BY VALUE AND WEIGHT—1998**

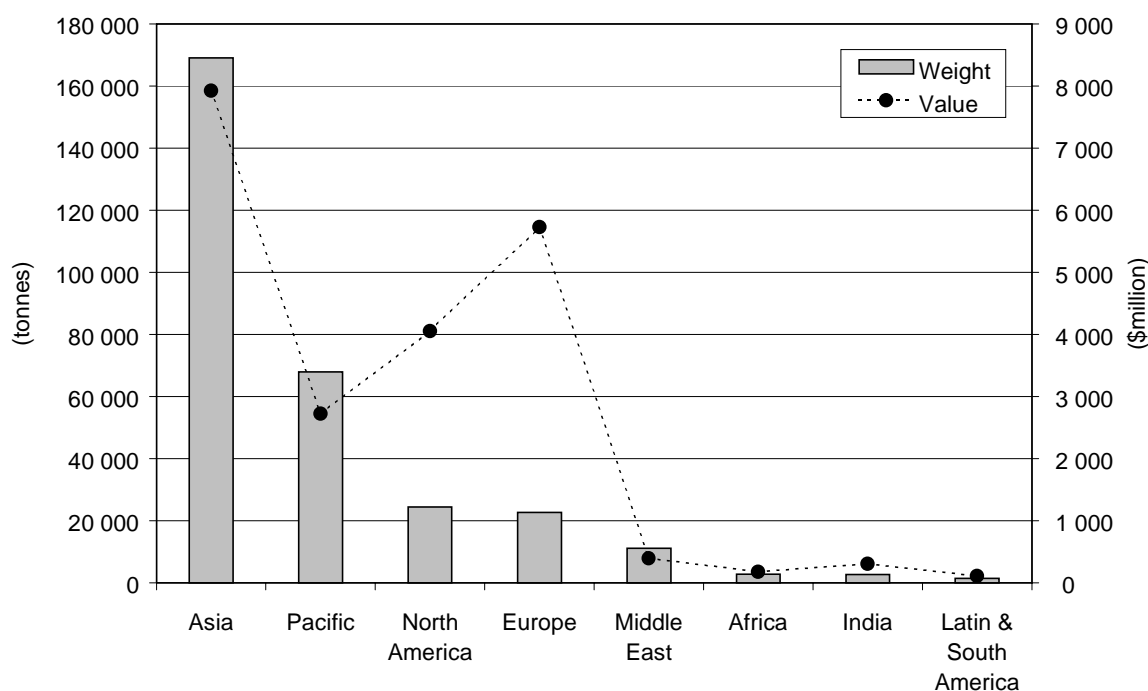


Source BTE analysis of ABS International Cargo Statistics (unpublished).

## Export destinations

Australia exports air and sea freight to destinations all over the world. The ABS data set used (International Cargo Statistics—unpublished) in this study contains over two hundred different destinations for Australian air freight in 1998. However, for convenience, these have been aggregated into eight main regions: Africa; Asia; Europe; India; Latin & South America; Pacific; Middle East; and North America. Figure 3 illustrates the relative importance of these destinations to Australian air freight exporters by weight and value.

**FIGURE 3 AIR FREIGHT DESTINATIONS, BY WEIGHT AND VALUE—1998**



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

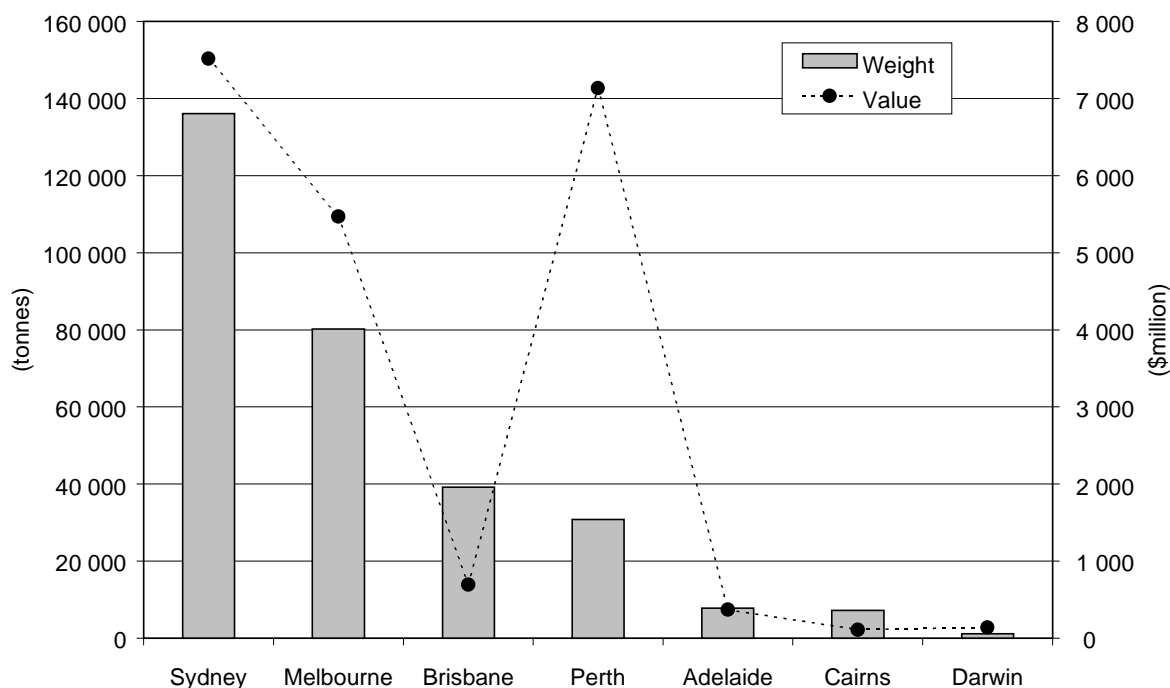
Asia as a region emerges as the most important destination in terms of both quantity and value of commodity exports by air. Asia is defined to include: Brunei, China, Hong Kong, Indonesia, Japan, Korea (Democratic Peoples Republic), Korea (Republic of), Laos, Macau, Malaysia, Mongolia, Philippines, Singapore, Taiwan, Thailand and Vietnam. Figure 3 also reveals that while Asia and the Pacific take the majority of exports, the average unit values of exports to North America and to Europe are significantly higher.

## Airport of exit from Australia

Air freight was exported through thirteen airports in 1998, but of these only seven (Adelaide, Brisbane, Cairns, Darwin, Melbourne, Perth, and Sydney) handled substantial export volumes.

Figure 4 illustrates the importance of these seven airports to the export trade in terms of the quantity and value of air freight exports handled in 1998.

**FIGURE 4 EXPORTS FROM MAJOR AUSTRALIAN AIRPORTS, BY WEIGHT AND VALUE—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

As would be expected, figure 4 shows that Sydney airport was the dominant point of departure for Australian air freight exports. Melbourne was next largest, handling twice as much as Brisbane or Perth. Adelaide and Cairns follow, handling roughly equal quantities of freight.

A point of interest in figure 4 is the spike in value of exports at Perth caused predominantly by gold exports.

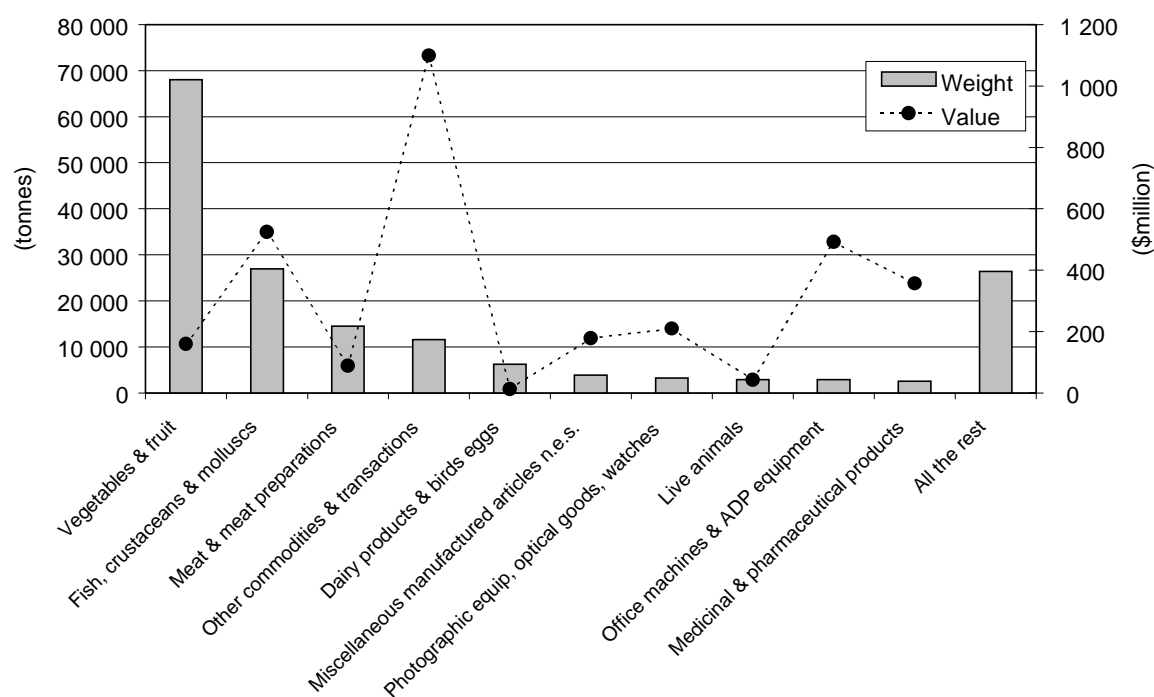
### COMMODITY EXPORTS BY AIR TO ASIA

The following discussion focuses on Australia's exports by air to the major (and emerging) Asian markets. Figure 5 illustrates the major commodity groups by weight (and value) exported by air to Asia in 1998.

By weight, *vegetables and fruit* emerged as the dominant commodity group, with 68 000 tonnes (40 per cent of the total) being flown to Asian markets in 1998. The two next largest groups were also foods: *fish crustaceans and molluscs* and *meat and meat preparations*. These three groups together accounted for 55 per cent of total air freight to Asia in 1998.

In terms of value, *gold, non-monetary* was the biggest earner at \$3.6 billion (not shown in figure 5 due to its low aggregate weight). The general category *other commodities and transactions* valued at \$1.1 billion was the third biggest earner. The highest ranking food group by value (\$525 million) was *fish, crustaceans and molluscs*.

**FIGURE 5 TOP TEN EXPORT COMMODITIES BY AIR TO ASIA, BY WEIGHT AND VALUE—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

The twelve Asian markets identified by Supermarket to Asia Ltd as being of particular importance to Australian food producers are listed in table 4, along with the quantity and value of air freight exports in 1998.

The table reveals that of these twelve Asian markets, three are dominant, or can be thought of in terms of the quantity and value of exports as the 'large' markets (Singapore, Japan and Hong Kong). These three between them take 74 per cent of all air exports. Two—India and Vietnam—are clearly 'small' markets, which each took a little over 1 000 tonnes in 1998. The rest could be described as the 'medium'-sized markets.

Part B of the study will present an analysis of each of the twelve markets in alphabetical order.

**TABLE 4 QUANTITY AND VALUE OF AIR EXPORTS TO 12 ASIAN MARKETS—1998**

<i>Country (destination of air freight)</i>	<i>Quantity (tonnes)</i>	<i>Value (\$million)</i>
Singapore	43 632	1 844
Japan	42 279	1 264
Hong Kong	39 216	1 725
Malaysia	11 837	283
Taiwan	9 175	583
China	5 375	214
Philippines	4 518	112
Indonesia	4 283	85
Thailand	3 764	262
Republic of Korea	2 439	1 488
India	1 279	248
Vietnam	1 169	34
Total	168 966	8 141

*Note* These figures relate to quantities recorded by freight forwarders/exporters as 'destined' for each country, rather than the quantity 'unloaded', which may include commodities for transshipment to other markets. Ranking in the table is based on quantity.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).



## **PART B—ANALYSES OF ASIAN MARKETS**

This section of the study presents a detailed analysis of the current and future air freight supply and demand from Australia to twelve Asian markets.

The approach taken in this analysis is moderately complex and detailed. To avoid repetition for each country, the approach is discussed only once.

Following a discussion of the analytical approach, individual country studies are presented. These comprise three groups defined as 'large', 'medium' and 'small' markets.

### **DETAILS OF THE ANALYTICAL APPROACH**

The approach taken in each of the country studies was to:

- ascertain the demand for air freight capacity from Australia—choosing 1998 as the most recent year for which comprehensive data are available;
- determine the amount of air freight capacity provided over this period and identify whether there were any pressures evident (that is, to what extent the supply of air freight capacity was used); and
- project the future level of air freight capacity supply and demand to identify whether there is any likelihood of pressures emerging in the future.

The data sources, assumptions and analytical process used in each of these stages are discussed below.

#### **Determining the demand on the air freight system**

The demand for air freight is determined as the weight of air freight uplifted in Australia and 'unloaded' in each country. The amount 'unloaded' is used in preference to the amount 'destined' for each country (where these differ, the difference is usually very small) as this is a more accurate assessment of the utilisation of air freight capacity on particular air routes.

The source of this data is the ABS International Cargo Statistics—unpublished series.<sup>2</sup> This data set was interrogated to determine the weight and value of commodity exports from Australia to each Asian country.<sup>3</sup> Commodity groups are defined at the

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<sup>2</sup> See appendix I for the abbreviated ABS commodity classes used.

<sup>3</sup> When interpreting the data analysis that has been undertaken for this study, the reader must be aware of the exclusions and the definitions that are used in the data collection process. The raw data contained in this study has been obtained from the International Cargo Statistics (unpublished) that is collected on behalf of the ABS by freight forwarders and exporters. The air cargo database excludes all transactions below \$1000 for exports and \$250 for imports. While this remains a limiting factor, it is expected that the majority of exports shipped from Australia will be contained in the database. The two definitions of particular interest in this study are the value and the gross weight of exports. The value of exports used in this study refers to Australian dollars free on board (FOB). According to Australian Harmonized Export Commodity Classification (p. E/11), the FOB point of valuation is where the goods are placed on board the international carrier at the

two-digit level; for example, '24' = *cork and wood*, except when dealing with commodity groupings which are predominantly food items. These were defined at the three-digit level; for example, '02'—*dairy products and birds eggs* was defined as '021'—*dairy products* and '022'—*eggs*. This partial three-digit breakdown was chosen to allow a closer focus on the food item exports.

Twelve quarters of data (1996Q1 to 1998Q4) were analysed to provide a view of the market before, during and after the major impact of the financial crisis.

The product of this stage of the analysis is the first of the tables in each of the following country studies.

### **Determining the supply of air freight capacity**

The supply of air freight capacity was determined as the amount of 'guaranteed'<sup>4</sup> cargo hold space available to exporters by airlines offering scheduled services between Australia and each country.

This capacity was measured using weight (tonnes) for several reasons. It allowed a consistent matching of supply and demand data for a particular period. While some commodities may face volume constraints, airlines advised that weight was actually the crucial factor. A mix of heavy and light commodities was usually needed to trim an aircraft's load, and consequently it was rare to find an aircraft loaded predominantly with one commodity type.

International airline timetable summaries provided by the Aviation Division of the Department of Transport and Regional Services (DoTRS) were used as the data source to determine the number of flights by aircraft type and airline. Both direct and indirect flight routings were included in the set and adjusted for the effect of code share agreements (that is, only the airline offering the flight was considered, not the airline selling the seats).<sup>5</sup>

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border of the exporting country. The value of these products represents the production costs and any other costs incurred in the placement of these products on international carriers; however, they exclude international insurance and transportation costs. The gross weights used in this study refer to the weight of goods in their packed state. This includes the packaging used to protect the product en route to its final destination, but excludes the international containers used to store the product, such as aircraft unit loading devices.

<sup>4</sup> 'Guaranteed' air freight capacity is defined as the residual weight-based capacity in the airline's cargo hold after deducting the weight of a 100 per cent passenger load and accounting for the fuel required to fly from Australia to the next port of landing.

<sup>5</sup> Splitting the assessment of airline cargo capacity down to the level of individual Australian airports was considered. However, examination of the historical data sets revealed that doing so would involve some arbitrary assumptions concerning the amount of cargo capacity devoted to individual airports on multi-sector flights (for example, Melbourne–Sydney–Hong Kong flights share cargo capacity between Sydney and Melbourne exports, but how much capacity for each airport was difficult to determine). Hence, estimates of quarterly cargo capacity are based on whole-of-Australia to each Asian country.

An extensive series of Aerocost 2<sup>6</sup> simulations were carried out to determine the 'guaranteed' cargo hold capacity that each airline would be prepared to make available to the Australian export market. This involved calibrating Aerocost 2 (where data were available) to each airline and airframe configuration, assuming 100 per cent passenger loadings and simulating the actual flight routing to determine trip fuel requirements. These calculations yielded a residual amount of cargo hold space (in tonnes) available for air freight. Typical container weight allowances were deducted from these totals to obtain a residual weight capacity available for freight. These values (by flight) were aggregated for each country to obtain quarterly (1998) estimates of total air freight capacity.

Airlines supported the approach used to calculate aircraft cargo capacities and confirmed that the results were reasonable. The output of this stage of the analysis is the second of the tables in each of the following country studies. These tables also report changes in the aircraft fleet mix, total number of passenger aircraft and freighter flights and total seats available during each quarter of 1998.

The estimates of 'guaranteed' capacities were then matched with actual air freight exports for each quarter of 1998 to determine whether the air transport sector was providing adequate freight capacity for Australian exporters.

### **Projecting future air freight capacity supply and demand**

Forming a definite view on how export markets to Asia will develop, particularly given that the focus in this study is only on the part of the market that uses air freight, is not possible. Rather, the approach was to develop a likely scenario projection of the future for each market, involving explicit assumptions about the forces driving economic development and the implications for air freight capacity supply and demand.

#### ***Future demand***

This study draws on the economic activity projections of the International Monetary Fund (IMF) (1999), which forecast real gross domestic product (GDP) for 1999 and 2000, and those of Supermarket to Asia (1998a-1), which focuses more on the short- to medium-term implications of the financial crisis on food imports by Asian countries. These forecasts form the basis of prognoses for the pace of recovery of Australian exports to Asian countries that have suffered the effects of the crisis and the rate of growth in consumption of Australian exports for other Asian economies.

It is assumed that the modal share of each export commodity is unchanged in the short term. Export growth/decline in the 'food' and 'other' (the rest) commodity groups were forecast separately, because, for 'food' exports, the views of

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<sup>6</sup> The Aerocost 2 computer model has been developed by the BTE to calculate aircraft direct operating costs. Costs include capital, maintenance, fuel, crew, airport, en route, provisioning, ground handling and freight handling. An update of Aerocost 2 databases (*Update99*) was released in June 1999.

Supermarket to Asia on the timing and magnitude of recovery were adopted, whereas the more general economic forecasts of the IMF were used for 'other' commodities. It is important to note that, in this study, the 'food' category only includes food commodity groups that comprised the top 15 in 1998. As such, it represents major food items, but not all food. Lower volume food exports are therefore included in the residual 'other' category.

The approach employed was to look at changes in economic growth rates (real year-on-year GDP), correlate these with the growth rate and/or magnitude of additional exports, and use the correlation as a basis for projecting 1999 and 2000 export volumes (for 'food' and 'other' categories). The considerations taken into account in forming the outlook are discussed in more detail in each of the country studies.

The product of this analysis is a scenario set of total export quantity (weight) estimates for 1999 and 2000—the third table in each of the following country studies.

### ***Future supply***

The future capacity in the air freight system was estimated by starting with a number of assumptions. First and foremost is that all the Asian markets are predominantly passenger markets; that is, the great majority of flights are of passenger aircraft, and the majority of cargo capacity between Australia and Asian countries is in the belly-holds of these aircraft<sup>7</sup>.

Next, the nature of the passenger market over time is analysed. The analysis comprises the composition of the market (Australian and foreign travellers), the effect of the Asian crisis on the market, and the proportion of the market that is origin–destination (OD) traffic compared with uplift–discharge (UD) traffic.<sup>8</sup> An examination of these data, together with an assessment of how the supply of seats to the market changed during 1998, provides a view on the likely supply of seats in 1999 and 2000. It is assumed that the supply of seats approximately correlates with the supply of cargo space and thus a scenario projection for the supply of air freight capacity in 1999 and 2000 can be made. A few further adjustments were made to those markets that saw the entry of freighter flights in late 1998 or early 1999.

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<sup>7</sup> Asimus (1998, p. 14) estimated that some 95 per cent of international air freight is carried in the belly-hold of passenger aircraft.

<sup>8</sup> Origin–destination (OD) traffic is a measure of passenger traffic between the commencement point and the end point of a journey, as distinct from uplift–discharge (UD) traffic, which is traffic between the point of take-off and landing (BTCE, 1994, pp. 405, 409). UD data show the movement of traffic between two airports not necessarily directly connected, but with the traffic having the same flight number. Typically, flight numbers change when an aircraft reaches its home country. This means that UD data for a port in an operator's home country are likely to be overstated by traffic whose OD point is beyond that port. For example, UD traffic reported for Singapore could include traffic whose OD is Europe (Department of Transport and Regional Services, 1999, p. iv).

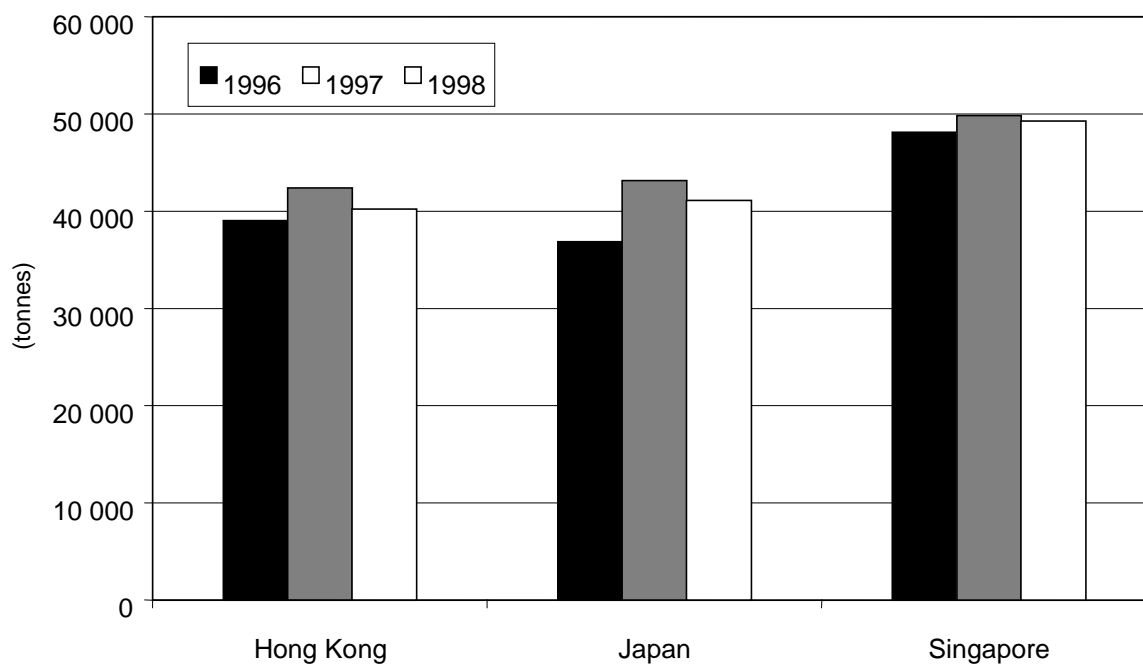
### ***Implications for the future***

Scenario projections of air freight capacity supply and demand are compared. From these results, it is possible to determine whether pressures on the capacity of the air freight system, from Australia to Asian countries, might arise in the near future.

### **ANALYSIS OF THE 'LARGE' MARKETS**

In 1998, Hong Kong, Japan and Singapore together received three-quarters of all the air freight exports from Australia to the twelve Asian countries considered in this study. All three markets also showed some evidence of a downturn in demand for Australian exports in 1998. Figure 6 displays the size of these three markets (in terms of export volumes 'unloaded') over the three years from 1996 to 1998.

**FIGURE 6 AIR FREIGHT EXPORTS TO THE 'LARGE' ASIAN MARKETS—1996–1998**



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### **Hong Kong**

#### ***Exports (by air)—1996–1998***

Hong Kong is a 'large' and well developed market for Australian air freight exports, receiving 40 231 tonnes of commodities from Australia in 1998<sup>9</sup>. This is about five

<sup>9</sup> 40 231 tonnes of air freight were flown from Australia and 'unloaded' in Hong Kong in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, of this 40 231 tonnes, 39 216 tonnes were recorded by freight

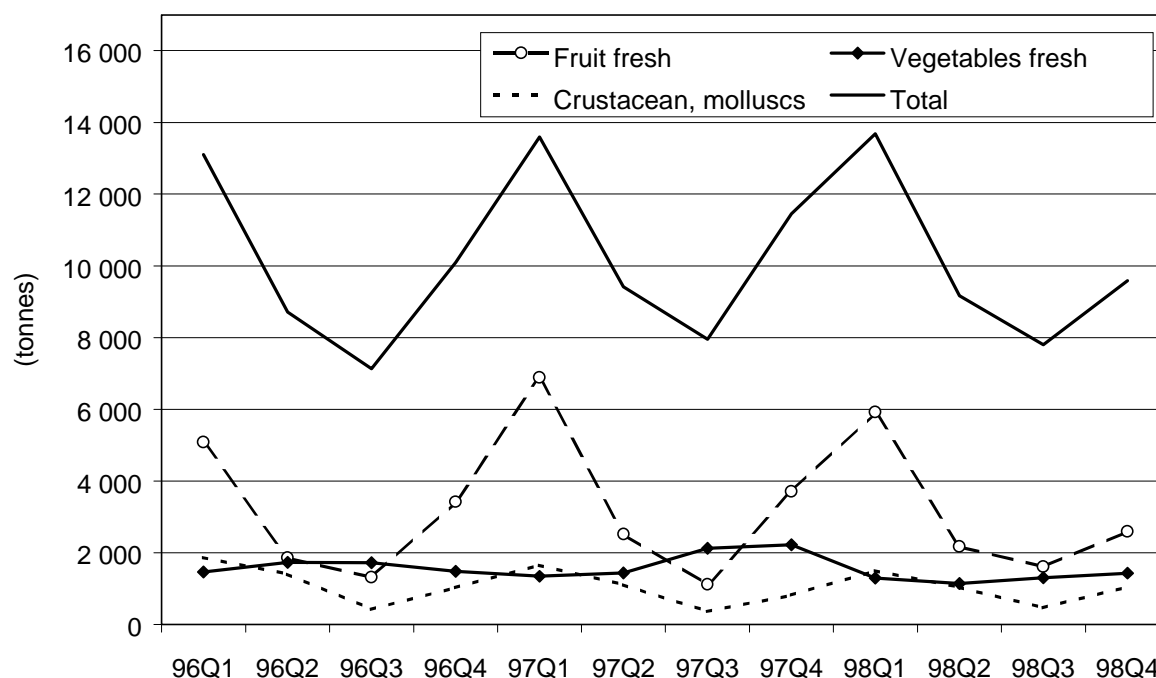
per cent less than the 42 413 tonnes received in 1997, and most likely indicative of the economic recession experienced by Hong Kong in 1998. Another key aspect of the Hong Kong market is its extreme seasonality—there is a difference of about 6000 tonnes in exports between the first and third quarters of each year.

*Major export groups*

The *fresh fruit* commodity group has dominated air freight exports to Hong Kong over the last three years, constituting about 30 per cent of the total export volume in each year. The market shows very strong seasonality, with demand peaking sharply in the first quarter of each year, during which 40 to 50 per cent of the annual volume is freighted. Concurrent with the decline in overall exports to Hong Kong between 1997 and 1998, *fresh fruit* exports fell from 14 200 to 12 300 tonnes.

The next commodity group in importance is *fresh vegetables*, which over three years (1996 to 1998) constituted about 15 per cent of the total quantity of air freight. *Fresh vegetables* have not been noticeably seasonal in demand, and like *fresh fruit* fell slightly in total quantity in 1998. Following closely behind *fresh vegetables* in terms of quantity are *crustaceans, molluscs* at about ten per cent of the total for each year (1996, 1997 and 1998). However, unlike *fresh fruit* and *fresh vegetables*, the demand for *crustaceans, molluscs* did not fall in 1998. *Crustaceans, molluscs* are also highly seasonal, peaking in the first quarter. Figure 7 illustrates a three-year quarterly history of tonnages of these major export groups.

**FIGURE 7 AIR FREIGHT EXPORTS TO HONG KONG—1996–1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

forwarders/exporters as ‘destined’ for Hong Kong. In other words, 1015 tonnes (or about 2.5 per cent) was for transshipment to other markets.

### Food exports

Over 1996 to 1998, food items made up eight of the top 15 commodity groups exported by air to Hong Kong. These eight food groups constituted 71 per cent of the total air freight to Hong Kong over the period, a proportion that, give or take a few percentage points, remained constant over the three years. In addition to the *fresh fruit, fresh vegetables, crustaceans, molluscs* already mentioned, the other food groups were *fish, meat, dairy products, preserved fruit* and *preserved crustaceans*.

Both *fish* and *dairy products* fell by around 20 per cent in 1998 after steady growth in 1997. *Preserved crustaceans* and *preserved fruit* grew in 1998 after suffering declines in 1997. *Meat* exports rose substantially in quantity over the three years—1162 tonnes in 1996, 1484 tonnes in 1997, and 2047 tonnes in 1998 (a 38 per cent increase in 1998 alone).

Table 5 provides more detail of the quantities of various commodity groups exported to Hong Kong over the period 1996 to 1998.

**TABLE 5 MAJOR COMMODITIES EXPORTED BY AIR TO HONG KONG—1996–1998**

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Fruit fresh	5 078	1 856	1 307	3 422	6 880	2 518	1 111	3 703	5 913	2 170	1 608	2 587
Vegetables fresh	1 463	1 730	1 723	1 476	1 340	1 432	2 121	2 220	1 289	1 143	1 299	1 427
Other commodities	993	85	98	134	254	431	477	712	1 285	1 042	914	1 084
Crustacean, molluscs	1 865	1 404	419	1 027	1 652	1 104	359	818	1 498	1 033	461	1 046
Fish	499	446	410	489	509	443	589	399	360	452	375	332
Meat	295	282	259	326	284	303	429	468	428	367	558	694
Non-ferrous metals	8	10	16	23	32	32	17	22	27	256	31	68
Dairy products	206	226	227	288	271	340	255	248	193	250	240	219
Office machines/ADP	132	180	319	180	94	161	173	269	210	214	272	191
Photographic etc	494	351	398	339	214	227	451	381	435	209	348	138
Misc manufactured	149	151	147	155	144	236	174	166	278	186	179	167
Medicinal	74	89	66	71	89	120	117	135	134	158	116	132
Crustacean preserved	290	234	121	163	163	136	125	139	185	153	164	179
Textiles	57	97	84	105	109	116	138	137	127	151	118	96
Fruit preserved	126	151	158	167	127	131	132	150	198	143	116	121
Other	1 382	1 423	1 380	1 726	1 432	1 685	1 282	1 490	1 124	1 240	999	1 104
Total	13 107	8 712	7 131	10 091	13 592	9 414	7 950	11 457	13 683	9 164	7 799	9 585

*Note* Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

### Air cargo capacity—1998

#### Airlines, flights and cargo capacity

During 1998, five airlines—Ansett International, Cathay Pacific, American International Airlines, Polar Air Cargo and Qantas—offered flights directly or indirectly connecting Australia and Hong Kong. Of these, American International

Airlines and Polar Air Cargo were freight-only airlines flying 747 freighter aircraft. US airlines such as Polar Air Cargo have no freight entitlements to North Asia unless they transit a South-East Asian port (Aviation Division, DoTRS pers. comm.) Direct flights to Hong Kong were therefore excluded from the analysis of freight capacity.

In 1998, 3143 flights were available, of which 2875 used passenger aircraft and the remaining 268 used dedicated freighters. The freighters offered around 16 900 tonnes (or 28 per cent) of the 59 900 tonnes of available cargo capacity, despite contributing slightly less than nine per cent of the flights.<sup>10</sup>

Over the four quarters of 1998 the overall number of flights in the market remained relatively constant, approaching around 800 per quarter. The number of seats offered over the four quarters was also fairly constant (give or take a few per cent). The single biggest change in aircraft types devoted to the route came in the second quarter, when the number of freighter flights fell from 78 to 62. This, in large part, led to a reduction in cargo capacity of around 1400 tonnes between the two quarters. However, the reduction in cargo capacity should not be taken as indicative of a problem with its supply—it is necessary to view this in the context of overall demand on the system. The following section discusses the alignment of cargo capacity supply and demand.

Table 6 summarises the estimated quarterly breakdown of flights and cargo capacity by aircraft type (passenger or freighter).

**TABLE 6 ESTIMATES OF CARGO SPACE AVAILABLE TO HONG KONG—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A330	91	91	91	91	364
	A340	91	117	156	156	520
	B747	351	351	338	288	1 328
	B767	156	156	152	199	663
	B747F	78	62	63	65	268
	Total	767	777	800	799	3 143
Seats	Passenger	218 000	226 000	236 000	227 000	907 000
Cargo capacity (t)	Passenger	10 100	10 200	11 600	11 100	43 000
	Freighter	5 200	3 800	3 800	4 100	16 900
	Total	15 300	14 000	15 400	15 200	59 900

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

*Source* BTE estimates.

<sup>10</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.



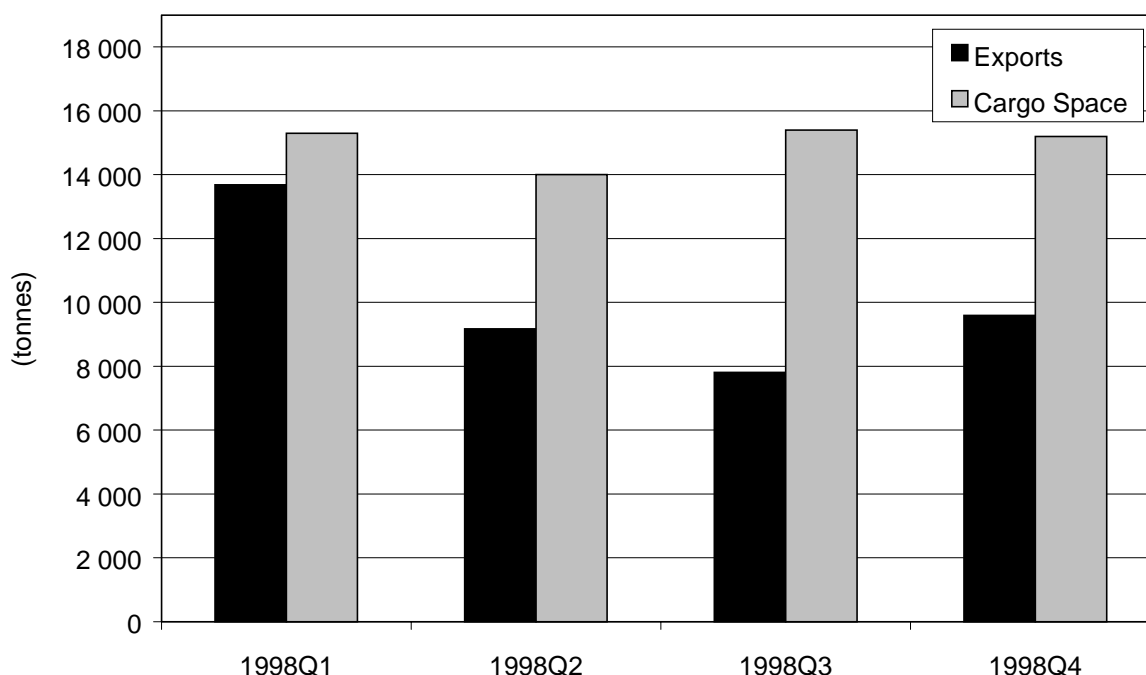
### *Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to Hong Kong) and the amount of export cargo space provided to this market by the airlines, provides a first-order assessment of the pressure, or the extent of demand, on the international air freight link of the logistics chain to Hong Kong.

Figure 8 illustrates the quarterly cargo space supply and demand on flights to Hong Kong during 1998. The data in the figure suggest that there was an adequate amount of overall air freight capacity in the Australia–Hong Kong market in 1998, except for some pressures in the first quarter of the year.

Hong Kong is a highly seasonal market with demand for *fresh fruit* at its highest in the first quarter of 1998. As a result, first quarter cargo capacity is relatively tight, and some exporters may have faced difficulties in obtaining guaranteed cargo space during this period.<sup>11</sup> It must be noted that this is a general analysis of supply and demand from the whole of Australia to Hong Kong. The analysis does not extend to the level of determining whether any flight from a specific airport on a particular day of the week was over-booked.

**FIGURE 8 AIR CARGO SPACE SUPPLY AND DEMAND TO HONG KONG—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

<sup>11</sup> The work of Douglas and Miller (1974) was drawn on in interpreting whether or not an 89 per cent overall cargo capacity utilisation (1st quarter 1998 in Figure 8) represents an air freight network approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to encounter capacity constraints in the overall network. As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.

### ***Outlook for the air freight sector***

It is not possible to form a definite view on the future air freight capacity supply and demand to Hong Kong, given the multitude of variables involved. However, it is possible to construct a reasonable scenario of what the supply and demand might look like under certain assumptions about the way the market develops in the near future. This scenario can then be interpreted as indicative or illustrative of the future under certain conditions. The following sections develop such a scenario.

#### *Hong Kong's economy and prospects for food exports*

The outlook for the Hong Kong economy (population 6.4 million, GDP per head \$US 25 200)<sup>12</sup> is for a slowdown in the short term, as regional instability has softened business confidence and reduced the trade in goods and services. The International Monetary Fund (1999) forecasts 1999 to be another year of economic decline for Hong Kong, albeit much less than in 1998, followed by a moderate pace of recovery in 2000. In the medium term, however, Hong Kong is expected to recover and grow considerably in importance as a destination for Australian agrifood exports.

Supermarket to Asia (1999a, p. 15) also notes that officially around 25 per cent of food and beverage imports into Hong Kong are being re-exported to China (although unofficially this proportion could be as high as 40 per cent). The implication of this is that, to some extent, any effect on Australian exports as a result of the downturn in Hong Kong will be moderated by some on-shipment to China, an economy to-date largely unaffected by the financial crisis.

#### *Demand for air freight capacity*

Taking into account forecast recovery rates for the Hong Kong economy, the food export outlook opportunities identified by Supermarket to Asia<sup>13</sup>, the last three years of Australian air freight export volumes to Hong Kong, and applying a few judgements, the following scenario has been developed for export quantities to Hong Kong in 1999 and 2000:

- In 1999, as the economy slows its recessionary dip, the rate of decline in food imports will wind back from the sharp reactive dip in 1998, although it will stay just negative of zero. The outlook is for minus two per cent (which loosely reflects the approximate 'two-times bigger' relationship with GDP growth that food showed in 1997 and 1998, but has been increased slightly to account for the more optimistic outlook suggested by Supermarket to Asia). Demand for 'other' Australian exports continues to rise (as it did in 1998 during a five per cent contraction of the economy), but at a reduced rate.

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<sup>12</sup> Supermarket to Asia (1999a), J.P. Morgan (1999).

<sup>13</sup> Supermarket to Asia (1998a, p. 15) reports on the state of the Hong Kong market have not indicated there will be a major decline in consumer consumption of imported food products and predicts that, in the long term, the food market in Hong Kong will continue to grow strongly and imports will continue to rise.

- In 2000, as the economy recovers, Australian food exports will increase (reflecting the two-times GDP rate), and ‘other’ commodity groups will also rise at a rate twice that in 1999, but still a little less than in the heady days of 1997.

Food items are considered separately because more information was available from Supermarket to Asia on the food export outlook. Also, food items make up a large part of the air exports market to Hong Kong (68 per cent of the top 15 commodity groups in 1998). They therefore clearly form an important set of commodities in developing a view on the future demand for air freight capacity.

Table 7 summarises the historical and projected scenario data for Hong Kong.

#### *The passenger market and supply of flights*

Australia–Hong Kong is an aviation market served to a large extent by passenger aircraft. In 1998, 91 per cent (2875 of the 3143 flights) were passenger services, delivering 72 per cent of the Australia-outbound air freight capacity. However, freighters were by no means an insignificant part of the market—there were 268 freighter flights from Australia to Hong Kong in 1998, an average over the year of 5.2 per week (although there was a decline over the year from 78 in the first quarter to 65 in the fourth quarter, the bulk of which occurred in the second quarter).

Hong Kong has a large and mature air transport market with Australia. In 1998, as the economy slipped into recession, the number of passenger flights actually increased, while the number of freighter flights decreased. Given this, plus the fact that 72 per cent of the total volume of cargo space in the market was provided in passenger aircraft belly-holds, it is reasonable to construct a scenario for future growth/decline in total cargo space based on the projected change in passenger aircraft flights.

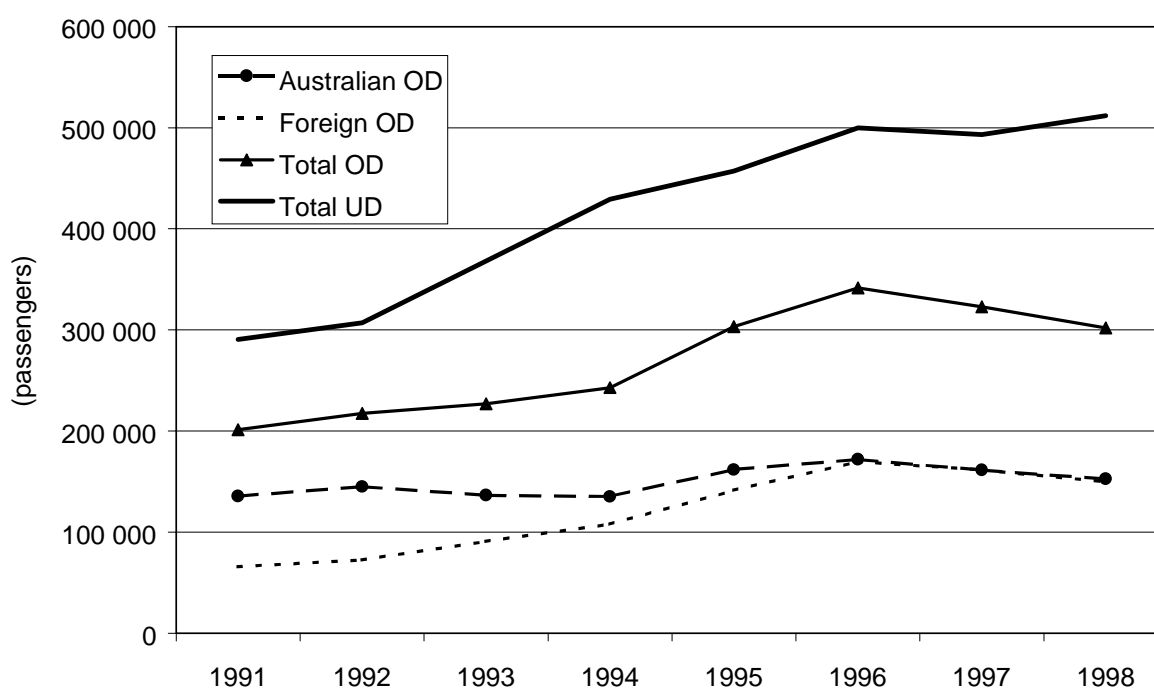
An eight-year time series of origin–destination traffic between Australia and Hong Kong illustrates the evolution of the passenger market in recent times (figure 9). Between 1991 and 1996, the number of foreign visitors to Australia grew steadily at an annual average rate of close to 21 per cent. In 1997 and 1998, passenger numbers fell by five and 7.5 per cent respectively. A similar pattern was observed for Australian visitors to Hong Kong, except that these passenger numbers grew from 1991 to 1996 at close to an average of five per cent per annum. In 1996, 1997 and 1998, the passenger market was close to being equally split between Australians and foreigners. More uplift–discharge (UD) passengers are recorded in the Australia–Hong Kong market than pure origin–destination (OD), reflecting the hub nature of Hong Kong.

**TABLE 7 SCENARIO OUTLOOK FOR AIR FREIGHT TO HONG KONG**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	4.5	5.3	-5.1	-1.3	3.1
Food (annual % change)		10	-12	-2	6
Other (annual % change)		6	13	5	10
Food (tonnes)	28 133	30 899	27 201	26 700	28 300
Other (tonnes)	10 916	11 517	13 033	13 700	15 000
Total (tonnes)	39 049	42 416	40 234	40 400	43 300

Sources International Monetary Fund (1999), BTE estimates.

**FIGURE 9 AUSTRALIA–HONG KONG AIR PASSENGER MARKET—1991–1998**



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS (1999).

In developing the scenarios for 1999 and 2000 it is assumed that:

- The decline in both Australian and foreign passengers in the Australia to Hong Kong air travel market will continue, but will probably slowdown and flatten-off in the not too distant future. The Tourism Forecasting Council (1999) forecasts no change in foreign arrivals in this market in 1999 over 1998, and a six per cent increase in 2000.
- The moderate divergence between OD and UD demand in 1997 and 1998—which is largely due to Hong Kong acting as a regional hub—will continue. This is

because Hong Kong is likely to retain and enhance its regional hub advantages to airlines serving intra- and extra-Asian markets, despite a flat OD demand.

- The outlook for changes in the number of flights in the market is linked to the outlook for UD demand, (assumed to be three per cent per annum—a slightly moderated 1998 growth rate).

These assumptions generate a net number of UD passengers in the Australia–Hong Kong market of 527 000 in 1999 (a year-on-year increase of 15 000) and 543 000 in 2000 (a year-on-year increase of 16 000).

A further assumption made is that the average UD seat utilisation achieved in 1998—moderately consistent across all quarters—will be roughly maintained by the airlines in this market into the near future. The consequence of this line of reasoning is that, for the 1999 scenario, airlines are expected to increase seats to Hong Kong by three per cent (this is supported by the 1999 Northern Summer timetable submitted to DoTRS), and by a further three per cent in 2000. Assuming a constant passenger aircraft fleet mix, this also means an increase in belly-hold air cargo capacity of the same amounts. The 1999 timetable also reveals that Polar Air Cargo and American International have withdrawn freighter services from this market, leaving Qantas and Cathay Pacific as the sole freighter providers. This has led to a reduction of about 2500 tonnes of cargo capacity in 1999, which is assumed to remain constant in 2000.

#### *Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 10 illustrates the result. It appears, under the assumptions of the scenario, that Australian exporters to Hong Kong will not face any significant air freight capacity constraints in the short- to medium-term.

## **Japan**

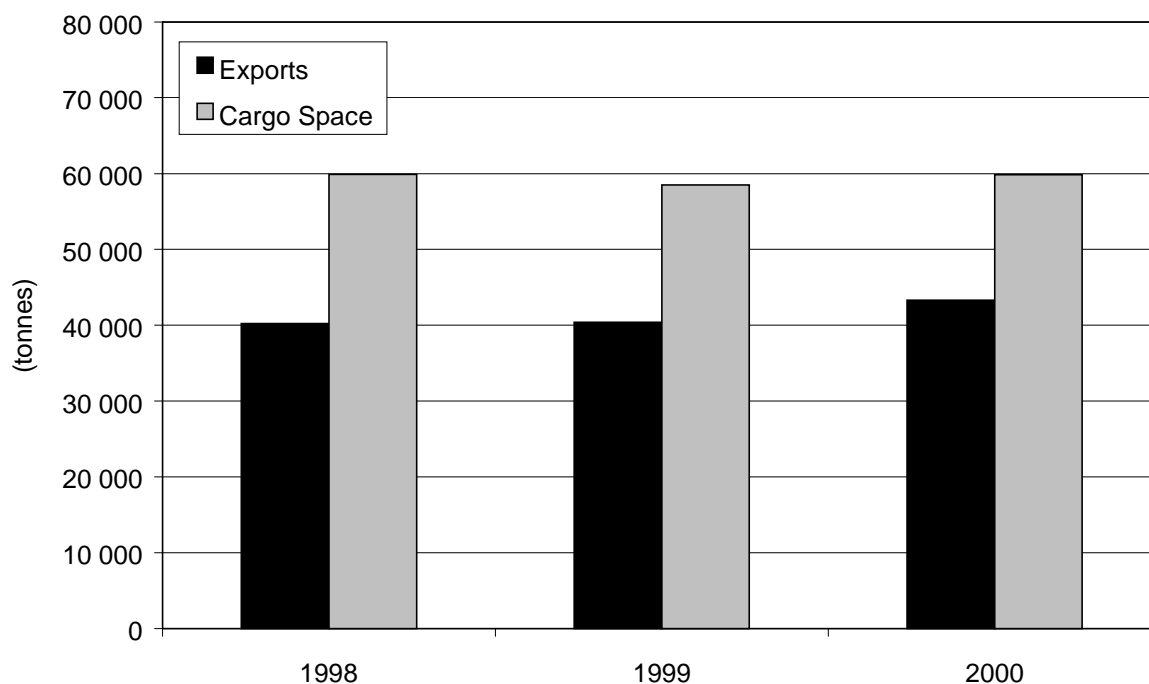
### ***Exports (by air)—1996–1998***

Japan is the second largest market for Australian air exports after Singapore. In 1998, 41 112 tonnes of Australian commodities were exported by air to Japan.<sup>14</sup> This represents a small decline (approximately five per cent) compared to 1997, when 43 148 tonnes were exported. The decline reflects, for the most part, the downturn in economic activity and recession experienced by Japan during 1998. The economic downturn was a result of both internal problems and the onset of the financial crisis.

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<sup>14</sup> 41 112 tonnes of air freight were flown from Australia and ‘unloaded’ in Japan in 1998. This quantity represented the demand for air freight capacity between the two countries — the focus of this study. However, 42 279 tonnes were recorded by freight forwarders/exporters as ‘destined’ for Japan. In other words, 1167 tonnes (or almost three per cent) arrived in Japan via other countries (on indirect flight routings).

FIGURE 10 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO HONG KONG—1999–2000



Source BTE analysis.

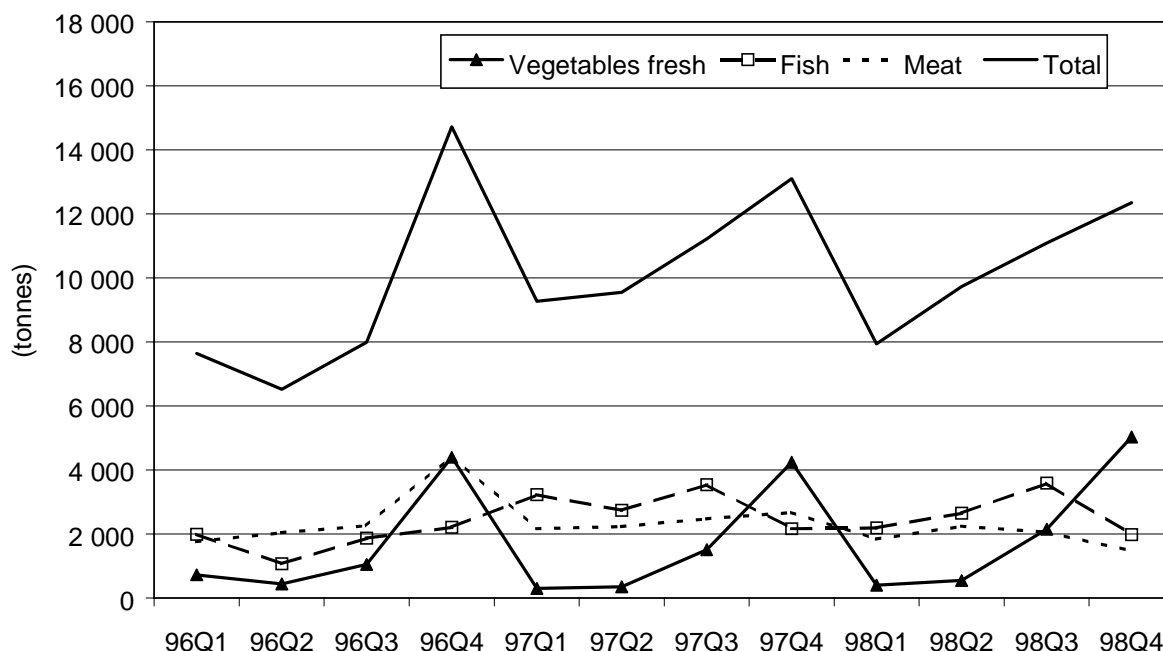
### Major export groups

Over the last three years *fish*, followed by *meat* and then *fresh vegetables*, have been the top three commodity groups exported by air to Japan. *Fish* exports represented almost one-quarter of total exports on average over the three-year period. The demand for *fish* experienced strong growth in 1997, but fell almost 11 per cent in 1998. *Meat* exports to Japan averaged more than 20 per cent of total exports during 1996–98, but their share of the total has been steadily declining (from 10 502 tonnes in 1996 to 9537 tonnes in 1997 to 7598 tonnes in 1998).

This represents an almost 30 per cent decline over the period and a 20 per cent decline in 1998 alone. Demand for *fresh vegetable* exports are seasonal, but have remained relatively strong over the period, averaging around 17 per cent of total exports. In contrast to other commodities, a small decrease in demand for *fresh vegetables* in 1997 was overshadowed by a 27 per cent increase in 1998.

Figure 11 illustrates a three-year quarterly history of tonnages of these major commodity groups.

FIGURE 11 AIR FREIGHT EXPORTS TO JAPAN—1996–1998



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### Food exports

Food items comprise nine out of the top 15 commodity export groups and represented almost 80 per cent of total air freight to Japan in 1998. Food has consistently comprised around 75 per cent of total exports over the period.

In addition to the *fresh vegetables*, *fish* and *meat* already discussed, Australia also exported *crustaceans*, *molluscs*, *preserved crustaceans*, *preserved fruit*, *preserved vegetables* and *miscellaneous edible* products to Japan. *Crustaceans*, *molluscs* showed strong growth in 1997 but remained stagnant in 1998, while *preserved crustaceans* were in constant decline over the period, falling by about 16 per cent in 1998. These two commodities appear to have been most affected by Japan's economic troubles. *Miscellaneous edible* products and *preserved vegetables* appear to have escaped any negative impact; both experienced considerable growth in 1998. *Preserved fruit* and *cereal preparations* also grew enormously (by more than 2000 and 500 per cent respectively) over the period, but this was due to their low starting bases.

Table 8 provides more detail of the quantities of various commodity groups exported to Japan between 1996 and 1998.

**TABLE 8 MAJOR COMMODITIES EXPORTED BY AIR TO JAPAN—1996—1998**

	1996	1996	1996	1996	1997	1997	1997	1997	1998	1998	1998	1998
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	(tonnes)											
Vegetables fresh	723	436	1 044	4 394	296	351	1 506	4 238	397	546	2 143	5 034
Fish	1 989	1 070	1 876	2 205	3 228	2 739	3 537	2 161	2 191	2 654	3 586	1 979
Meat	1 764	2 043	2 258	4 437	2 162	2 233	2 471	2 671	1 838	2 245	2 050	1 465
Crude animal & vegetable	182	139	634	685	148	133	575	790	108	138	501	861
Crustaceans, molluscs etc	499	496	170	558	579	650	209	650	651	607	184	647
Other commodities	34	78	52	91	56	82	161	94	114	123	188	172
Office machines/ADP	88	112	100	79	96	141	192	157	106	108	87	163
Misc manufactured	104	158	129	95	89	132	201	103	122	112	619	162
Crustaceans preserved	165	449	288	113	107	372	334	146	109	312	233	150
Live animals	110	7	161	333	345	922	708	608	396	244	84	87
General industrial	97	77	83	87	79	141	90	73	91	96	52	65
Miscellaneous edible	44	48	20	49	29	44	12	51	40	109	85	61
Fruit preserved	8	18	8	10	10	18	11	99	124	842	266	19
Vegetables preserved	395	88	1	26	642	277	0	7	570	365	22	19
Cereal preparations	13	18	6	15	34	21	11	59	77	293	20	18
Other	1 427	1 280	1 159	1 543	1 376	1 292	1 204	1 198	1 004	935	974	1 449
<b>Total</b>	<b>7 641</b>	<b>6 516</b>	<b>7 986</b>	<b>14 719</b>	<b>9 274</b>	<b>9 547</b>	<b>11 223</b>	<b>13 104</b>	<b>7 937</b>	<b>9 729</b>	<b>11 094</b>	<b>12 351</b>

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### *Airlines, flights and cargo capacity*

Six airlines—All Nippon Airways, Qantas, Ansett International, Japan Airlines, American International Airlines and Federal Express—flew either directly or indirectly between Australia and Japan in 1998.

In total, there were 3694 flights available in 1998, of which 3602 (98 per cent) used passenger aircraft and the remaining 92 used dedicated freighters. Federal Express began operating in the Australia–Japan market in the third quarter of 1998. These dedicated freight services made available around 2100 tonnes of cargo space or four per cent of the total for 1998 (59 000 tonnes). In the fourth quarter of 1998, however, dedicated freighter capacity represented 11 per cent of the market. This was a result of Federal Express increasing flights from two to five per week.

During the course of 1998, the number of passenger aircraft flights from Australia to Japan fell considerably from 1014 to 781 (a 23 per cent decline). The number of seats and the available cargo space on passenger aircraft also experienced significant declines (21 and 23 per cent respectively).<sup>15</sup>

<sup>15</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this



Table 9 summarises the quarterly breakdown of flights and cargo capacity by aircraft type.

**TABLE 9 ESTIMATES OF CARGO SPACE AVAILABLE TO JAPAN—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	B747	715	702	637	627	2 681
	B767	299	234	234	154	921
	B747F	0	0	0	10	10
	MD11F	0	0	26	56	82
	Total	1 014	936	897	847	3 694
Seats	Passenger	357 000	336 000	312 000	283 000	1 288 000
Cargo capacity (t)	Passenger	16 000	15 100	13 400	12 400	56 900
	Freighter	0	0	600	1 500	2 100
	Total	16 000	15 100	14 000	13 900	59 000

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

### *Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to Japan) with the amount of export cargo space airlines made available to this market in 1998 provides a first-order assessment of the existence, or extent of, any demand pressures experienced by the air freight link of the logistics chain between Australia and Japan.

Figure 12 shows the quarterly supply and demand for air freight to Japan in 1998. It shows that for the first two quarters of 1998, between half to two-thirds of available capacity was being utilised. As the Japanese recession and Asian crisis took effect, flights were cut and utilisation rates increased significantly. The Japanese market clearly experienced a decline in the supply of available cargo space during 1998, while demand for space continued to rise throughout the year as a result of the seasonal nature of the commodities exported.

Overall, figure 12 indicates that no capacity constraints occurred in the first half of 1998. However, it seems reasonable to conclude that, at least for the last quarter of 1998, demand for capacity was such that exporters faced some constraints in purchasing guaranteed space.<sup>16</sup> The demand for *fresh vegetables*, one of the major

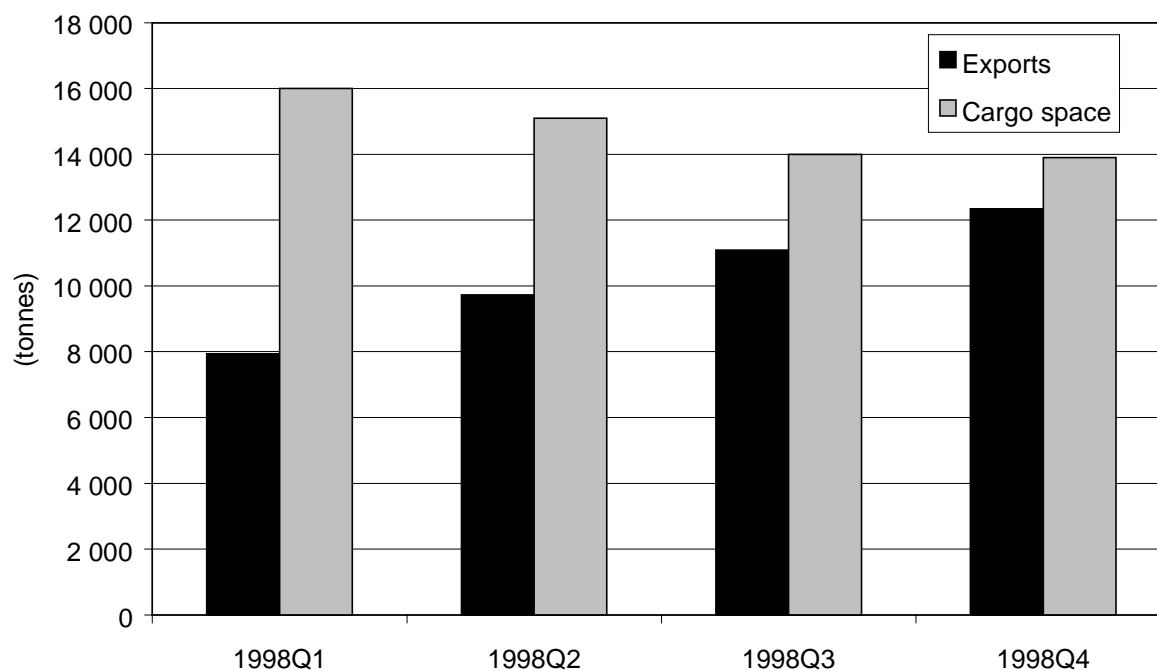
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minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

<sup>16</sup> The work of Douglas and Miller (1974) was drawn on in interpreting at what level of cargo capacity utilisation an air freight network is approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to encounter capacity constraints in the overall network.

export groups, is subject to large seasonal trends peaking in the final quarter of each year. If this historical seasonality continues, the appearance of any possible constraints in the last half of 1998 is likely to disappear in the first part of 1999 as *fresh vegetable* exports move toward their seasonal low point.

FIGURE 12 AIR CARGO SPACE SUPPLY AND DEMAND TO JAPAN—1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

The multitude of variables required to definitely predict future air freight capacity supply and demand to Japan puts the task beyond the scope of this study. Under certain assumptions about the Japanese market, however, it is possible to construct a reasonable scenario of future air freight supply and demand. The results of this scenario analysis can then be used as a guide to future supply and demand under the conditions assumed. The following sections develop such a scenario.

#### ***Japan's economy and prospects for food exports***

The outlook for the Japanese economy, the world's second largest economy, with a population of 120 million and GDP per capita of \$US 29 400<sup>17</sup> is for economic conditions to recover slowly, but remain depressed over the short- to medium-term. Major financial adjustments are yet to occur as a result of the recession currently

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As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.

<sup>17</sup> Supermarket to Asia (1999b), J.P. Morgan (1999).

being experienced. These forthcoming adjustments are expected to sustain the Japanese slowdown. According to the International Monetary Fund (1999), the outlook for Japan in terms of real GDP growth is -2.8 per cent in 1998, -1.4 per cent in 1999 and 0.3 per cent in 2000.

The Japanese economy is currently in recession, causing considerable adjustments in the finance and real estate sectors. This downturn in economic activity has created great uncertainty, as large reductions in consumer demand, capital spending and exports to the rest of Asia take their toll on the economy. The financial turmoil in Asia exacerbated the Japanese situation, because many of Japan's banks were heavily exposed to the countries in crisis and suffered dramatic increases in bad debts. Overall, short-term consumer demand is expected to continue to be dampened and growth of imported foods constrained by the falling yen, rising unemployment and forecast negative growth.

Supermarket to Asia (1998b, p. 5) anticipates food imports from Australia to grow strongly over the medium-term, sustaining Japan's position as the largest single destination for Australian agrifood exports. In addition to the recently favourable exchange rate, there are several other factors behind this expectation—Japan's agricultural sector is in decline, the Government is committed to further trade liberalisation and the western diet is becoming increasingly popular.

#### *Demand for air freight capacity*

Given that food items have consistently represented the bulk (around 75 per cent) of total air exports to the Japanese market, they clearly will be the critical commodities to take into account when formulating a scenario for future air freight capacity demand. This, in addition to the more detailed information on food exports (courtesy of Supermarket to Asia), makes it possible to separate major food commodity groups from the rest of exports. Supermarket to Asia (1998b) forecasts that food exports to Japan will continue to rise in both the short- and medium-term despite current economic difficulties.

The outlook for the Japanese economy is a further 1.4 per cent decline in GDP in 1999, followed by a marginal recovery of 0.3 per cent in 2000. It is assumed that this slow recovery means the economy remains relatively flat and that the export profile of 1998 is representative of 1999. Table 10 indicates that Australia's major food exports to Japan are relatively more resilient to economic shocks, with their rate of growth falling in 1998, but not to the same negative level as 'other' exports. 'Other' exports, representing almost 25 per cent of air exports to Japan, increased by 23 per cent in 1997, but fell by 18 per cent in 1998. Major food exports increased by 15 per cent in 1997 and managed to hold their ground in 1998 with zero growth.

As a result of this performance, and Supermarket to Asia's medium-term views, it is assumed that food exports to Japan will resume growth (three per cent in 1999, followed by six per cent in 2000) and continue to be a strong growth market over the medium-term.

Trade data for 1996–98 shows that ‘other’ exports were severely affected by the recession and it is expected that these exports will continue to suffer considerable falls, with growth not returning until 2000 and exports well below 1997 levels.

Overall, based on historical trade data, Supermarket to Asia outlooks and International Monetary Fund GDP forecasts, the scenario suggests that Australia’s total exports to Japan will remain flat in 1999, but recover to 1997 volume levels in 2000. Table 10 summarises the historical and projected scenario data for Japan.

**TABLE 10 SCENARIO OUTLOOK FOR AIR FREIGHT TO JAPAN**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	5.0	1.4	-2.8	-1.4	0.3
Food (annual % change)		15	0	3	6
Other (annual % change)		23	-18	-12	5
Food (tonnes)	27 740	31 964	31 951	32 900	34 900
Other (tonnes)	9 121	11 184	9 161	8 100	8 500
Total (tonnes)	36 861	43 148	41 112	41 000	43 300

Sources International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

The Australia–Japan aviation market is served largely by passenger aircraft. In 1998, 98 per cent of flights were passenger services, providing 96 per cent of the air freight capacity available. Over the short- to medium-term future it is reasonable to assume that this market profile will not change significantly. To construct plausible scenarios for the future supply of freight capacity it is therefore necessary to do the same for the future supply of passenger services.

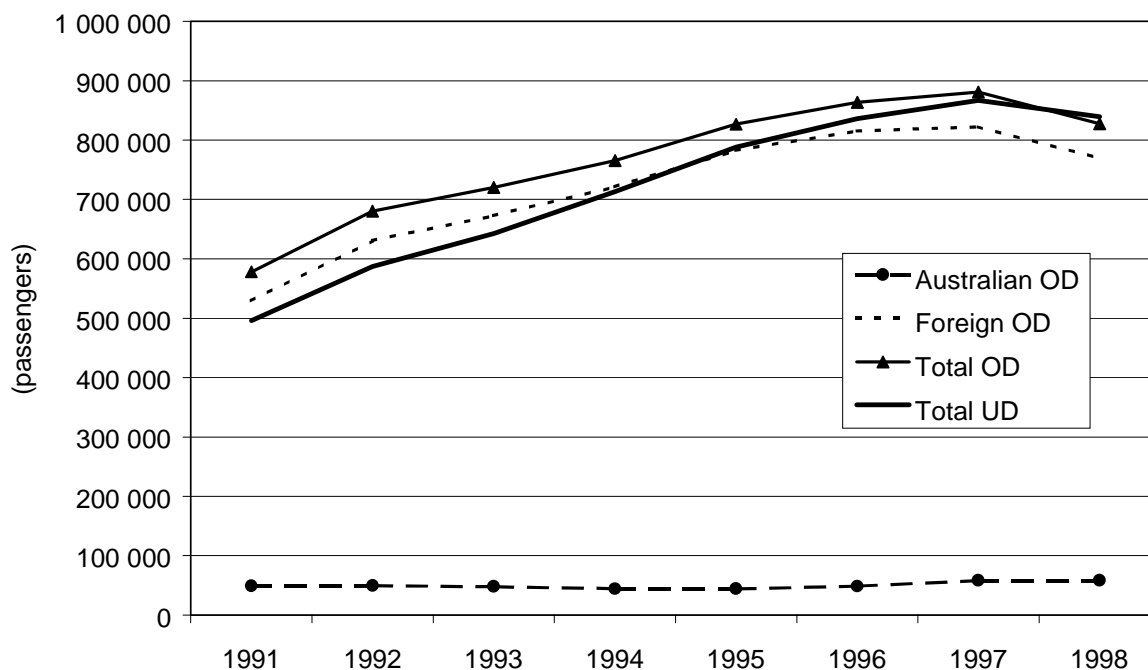
Future freight capacity growth is likely to occur largely in passenger aircraft. The supply of passenger aircraft is determined by passenger demand and government regulations in the market, not the demand for freight capacity. There are no government limits on the growth of freight services in this market—the Australia–Japan bilateral air service agreement currently has considerable unutilised capacity in the passenger market and dedicated freighters are permitted to service the market<sup>18</sup>.

The evolution of the Australia–Japan passenger market is shown in figure 13, which displays an eight-year time series of origin–destination traffic between the two countries. Japanese visitors to Australia grew at an average annual rate of eight per cent between 1991 and 1997, while Australians visiting Japan grew at a rate of three per cent. The number of Japanese visitors to Australia has consistently far exceeded the number of Australians visiting Japan over the last eight years.

<sup>18</sup> However, advice from the Aviation division of the Department of Transport and Regional Services is that US airlines (such as Federal Express) flying to North Asia have no ex-Australia freight entitlements unless they transit a South East Asian port.

In 1998, Japanese visitors to Australia fell for the first time in the period by six per cent, reflecting the impact of Japan's economic troubles and the Asian crisis. At the same time, Australians visiting Japan remained relatively flat, declining by just 0.3 per cent. As Japan is mostly an end-point destination served by direct flights from Australia, the falls in total origin-destination traffic were mirrored in uplift-discharge traffic.

**FIGURE 13 AUSTRALIA–JAPAN AIR PASSENGER MARKET—1991–1998**



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

Visitor arrival growth rate forecasts from the Tourism Forecasting Council (1999) predict a further five per cent decline in foreign arrivals in 1999 after an eight per cent fall in 1998. The Tourism Forecasting Council predicts that visitor arrivals from Japan will not recover to 1997 levels until 2001, but pre-crisis growth rates will return in 2000. Average annual growth over 1998–2008 is forecast to be 6.6 per cent (Tourism Forecasting Council, 1999).

In line with these forecasts, historical passenger data and the general economic outlook for Japan, it is assumed that Japanese visitors to Australia will fall by five per cent in 1999, but recover to eight per cent growth in 2000. It is also assumed that the number of Australians visiting Japan will continue to grow at the average annual rate of three per cent in both 1999 and 2000.

Assuming relatively constant load factors and fleet mix, and moderated by what airlines have agreed in 1999 timetables, these assumptions lead to a scenario of continuing declines in demand for seats in the market in 1999 (four per cent) with

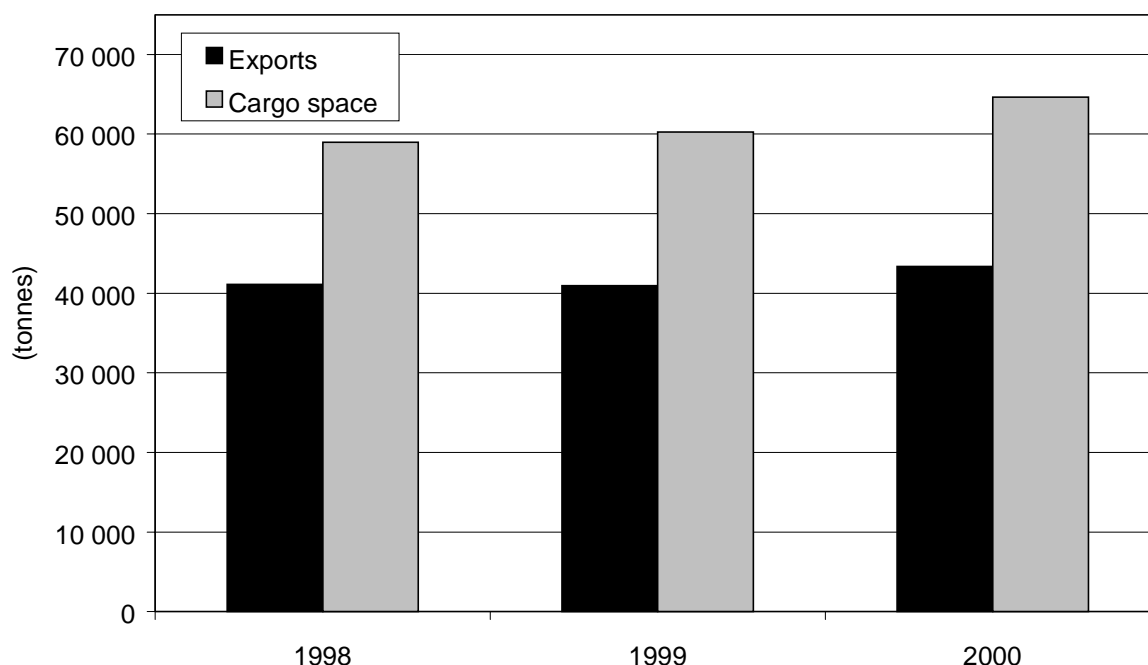
recovery beginning in 2000 (eight per cent growth) but demand for seats still below 1997 levels. It is therefore assumed that belly-hold cargo capacity will drop four per cent in 1999, but recover with eight per cent growth in 2000.

Federal Express continued to operate five dedicated freight flights per week in 1999 and it is assumed this is sustained into 2000. Combining these dedicated freighter assumptions with the belly-hold capacity produces an increase in available cargo space of two per cent in 1999 and seven per cent in 2000. The cargo scenario, therefore, is that falls in belly-hold capacity in 1999 are more than compensated by increasing dedicated capacity (Federal Express), with cargo space rising to 60 300 tonnes in 1999 and 64 600 tonnes in 2000.

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 14 illustrates the scenario outlook and indicates that, allowing for the assumptions made, and on an annualised basis, Australian exports to Japan will not face any significant air freight capacity constraints in the short- to medium-term. However, historical seasonal pressures are likely to remain for the last quarter over the short- to medium-term future, as the demand for cargo space is at its peak due to the seasonal nature of fresh vegetable exports to Japan.

**FIGURE 14 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO JAPAN—1999–2000**



Source BTE analysis.

## Singapore

### *Exports (by air)—1996–1998*

Singapore is the largest of the 'large' markets for air freight exports from Australia, receiving 49 294 tonnes in 1998.<sup>19</sup> The Singaporean market for Australian exports fell only marginally (one per cent) in 1998 compared to 1997 when 49 834 tonnes were exported. This is most likely a result of the Asian crisis, although Singapore was clearly not affected to the same extent as many of its neighbours. Despite this small decline, 1998 export levels were slightly above those of 1996 (48 130 tonnes). Singapore is a mature market for Australian exports with a relatively constant export profile since 1996.

### *Major export groups*

For the past three years, the main commodity exported by air to Singapore was *fresh vegetables*. In 1996 this commodity group represented 28 per cent (or 13 455 tonnes) of Australia's total exports to Singapore. Demand for *fresh vegetable* exports has remained relatively constant since 1996, recording a small increase during 1997 (to 15 894 tonnes) followed by a slight fall in 1998 (to 15 819 tonnes).

The next largest air freight export over the three years was *fresh fruit*, comprising around 20 per cent of Australian exports to Singapore over the period. Like *fresh vegetables*, *fresh fruit* experienced only a small variation in the quantity of exports during this period, increasing from 9415 tonnes in 1996 to 10 724 tonnes in 1998. In contrast to *fresh vegetables*, *fresh fruit* maintained a positive rate of growth in 1998. An examination of the quarterly data for both *fresh vegetables* and *fresh fruit* reveals the highly seasonal nature of these products. This seasonality occurs in opposite quarters, causing the fluctuations in the level of exports to Singapore. Figure 15 illustrates a three-year quarterly history of these major export groups.

### *Food Exports*

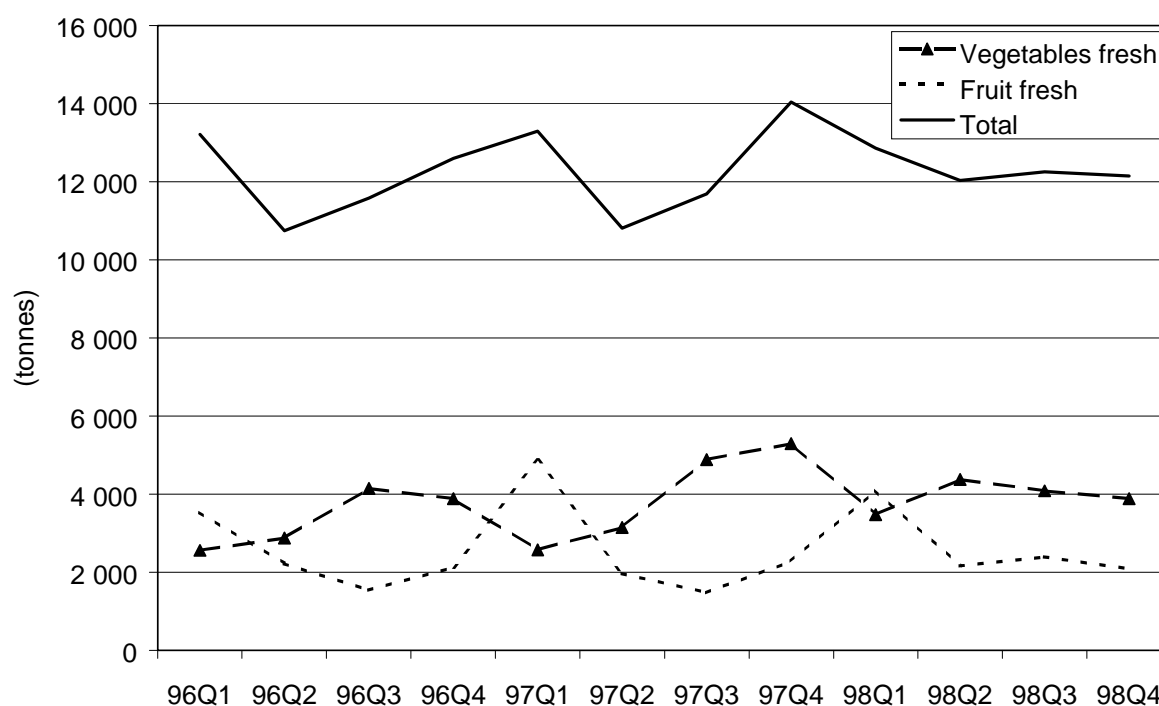
The Singaporean market was dominated by food exports during 1996 to 1998, with five of the top 15 commodity groups classified as food. In 1998, food items in the top 15 accounted for approximately 73 per cent of total commodities exported. This increase, from 66 per cent in 1996, suggests that food exports have been relatively unaffected by the Asian crisis. Singapore does not have an established domestic food production industry and relies heavily on imported food.

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<sup>19</sup> 49 294 tonnes of air freight were flown from Australia and 'unloaded' in Singapore during 1998.

This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, of this 49 294 tonnes, 43 632 tonnes were recorded by freight forwarders/ exporters as 'destined' for Singapore. This suggests that Singapore was used as a hub to tranship 5662 tonnes of freight to other destinations.

FIGURE 15 AIR FREIGHT EXPORTS TO SINGAPORE—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

Aside from *fresh vegetables* and *fresh fruit*, the other major food commodities Australia exported to Singapore were *meat*, *crustaceans*, *molluscs* and *dairy products*. *Meat* exports remained strong over the period, sustaining marginal growth (of one per cent) in 1998 after a 27 per cent increase in 1997. *Crustaceans*, *molluscs* and *dairy products* both suffered declines in trade in 1997. However while *crustaceans*, *molluscs* returned to a positive growth rate in 1998, dairy products continued to lose market share.

Table 11 outlines in more detail the degree of change in the level of exports to Singapore between 1996 and 1998.

### ***Air cargo capacity—1998***

#### *Airlines, flights and cargo capacity*

Singapore remains one of the busiest Asian destinations from Australia, with 11 airlines serving the market in 1998. These were Alitalia (operated by KLM), American International Airlines, British Airways, Emirates, Egyptair, Gulf Air, KLM Royal Dutch Airlines, Martinair, Polar Air Cargo, Singapore Airlines and Qantas. The majority of these airlines offered direct flights to Singapore, with only a small proportion going through intermediate airports.



TABLE 11 MAJOR COMMODITIES EXPORTED BY AIR TO SINGAPORE—1996–1998

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
(tonnes)												
Vegetables fresh	2 559	2 874	4 142	3 880	2 574	3 146	4 883	5 293	3 475	4 375	4 084	3 885
Fruit fresh	3 531	2 221	1 533	2 130	4 869	1 968	1 476	2 285	4 094	2 159	2 390	2 081
Meat	762	591	899	1 232	1 067	1 037	1 056	1 260	1 032	1 046	1 051	1 318
Other	1 535	1 587	1 538	1 758	1 552	1 563	1 250	1 425	1 042	1 095	1 307	1 291
Other commodities	1 221	152	165	219	323	203	296	544	785	494	646	846
Dairy products	1 162	1 174	1 042	1 066	1 033	897	858	1 292	948	1 022	1 072	810
Live animals	336	278	367	394	406	295	376	337	212	171	374	374
Office machines /ADP	353	400	445	408	234	295	239	242	167	222	233	281
General industrial	267	231	275	236	194	197	214	209	166	215	183	249
Crustaceans,molluscs	430	374	123	281	285	332	79	278	346	337	115	246
Misc. manufactured	212	202	247	239	197	237	249	234	209	206	180	205
Electrical	148	177	216	174	148	181	170	170	97	242	227	197
Photographic etc	337	200	228	242	123	151	153	194	70	108	89	118
Machinery specialised	130	106	137	132	119	138	152	92	67	133	104	111
Textiles	129	94	134	116	92	94	98	89	86	121	127	97
Road vehicles	99	79	87	86	79	72	141	96	66	85	70	38
Total	13 212	10 743	11 579	12 596	13 297	10 807	11 688	14 042	12 863	12 034	12 250	12 147

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore (11 per cent), are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

In total, there were 7015 flights between Australia and Singapore in 1998 of which 6641 (or 95 per cent) were passenger services, while the remaining 344 were dedicated freighters. The freighters provided approximately 22 400 tonnes (or 22 per cent) of the 102 000 tonnes of capacity available, though the number of dedicated flights represented only five per cent of the total.<sup>20</sup>

During 1998, the number of flights offered by the airlines varied only marginally across quarters. Overall, there was a small increase in the number of flights between Singapore and Australia during 1998—from 1755 to 1772. This flowed through to small increases in both the numbers of seats and cargo capacity over 1998. Cargo capacity increased over the year despite a substantial fall in the number of dedicated freighters serving the market (from 91 flights in the first quarter to 71 in the last quarter). This was a result of both an increase in the number of passenger aircraft flights and a change in the composition of aircraft fleet mix as airlines used the Boeing 777 which is more suited to medium flight distances than the Boeing 747 and Airbus A310 and A340.

<sup>20</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

Table 12 traces the changes in the number of flights and cargo capacity by aircraft type.

**TABLE 12 ESTIMATES OF CARGO SPACE AVAILABLE TO SINGAPORE—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A310	169	78	78	78	403
	A340	208	221	221	160	810
	B747	780	760	702	681	2 923
	B747F	91	91	91	71	344
	B767	364	370	382	416	1 532
	B777	143	208	286	366	1 003
	Total	1 755	1 728	1 760	1 772	7 015
Seats	Passenger	513 000	507 000	511 000	526 000	2 057 000
	Cargo capacity (t)					
	Passenger	19 500	19 800	19 700	20 400	79 400
	Freighter	5 800	5 600	5 600	5 400	22 400
	Total	25 300	25 400	25 300	25 800	101 800

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

*Source* BTE estimates.

### *Alignment of supply and demand—1998*

A review of the cargo space supply and demand to the Singaporean market provides a first order assessment of any pressures on international air freight services. This should quickly identify problem areas in the air freight logistics chain to Singapore.

Figure 16 illustrates the quarterly cargo space supply and demand on flights to Singapore during 1998. Only around half of the available freight capacity was utilised, indicating that exporters faced no problems in obtaining the cargo space required to export their product in 1998.

### *Outlook for the air freight sector*

A definite view on the future air freight capacity supply and demand to Singapore is difficult to establish because of the multitude of variables affecting the air freight sector. However, by exploring a scenario for air freight capacity, it is possible to establish how the market might develop under certain assumptions. The outcome of this scenario is used as indicative or illustrative of the future conditions in the market. The following sections develop such a scenario.

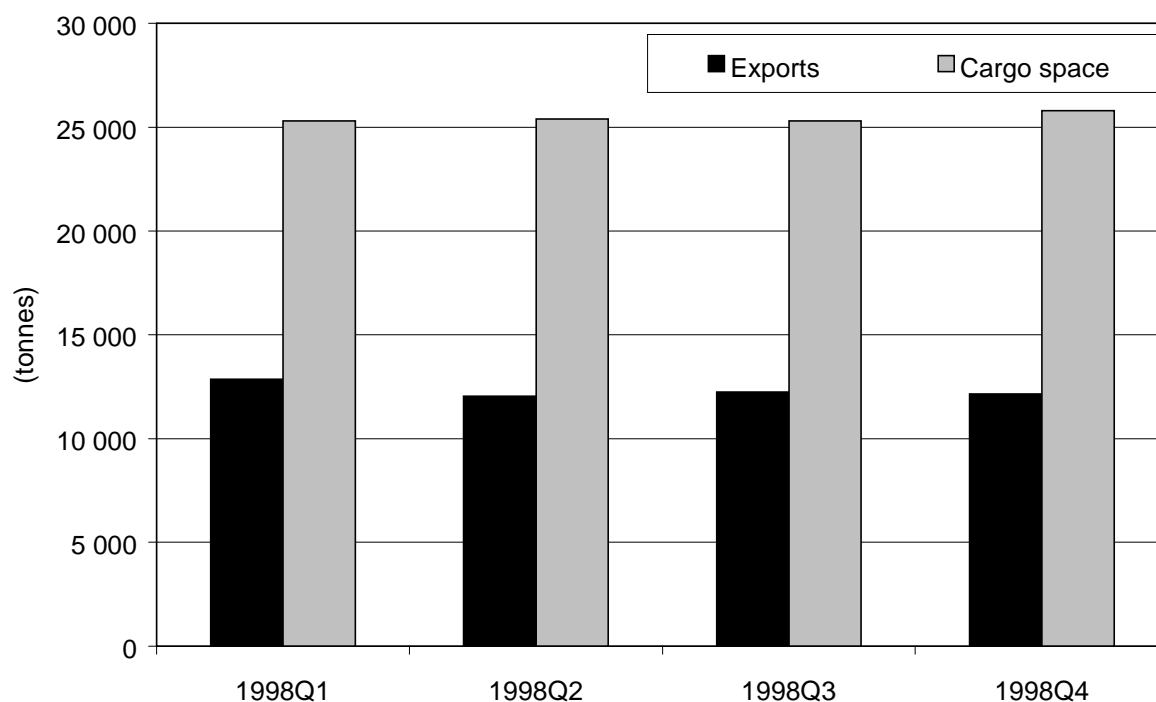
#### *Singapore's economy and prospects for food exports*

The outlook for the Singaporean economy (population 3.5 million, GDP per head \$US 22 800)<sup>21</sup> is for a decline in economic growth due to lower business confidence (reduced private investment) and reduced trade flows within the Asian region. Both

<sup>21</sup> Supermarket to Asia (1999c), J.P. Morgan (1999).

of these have an adverse effect on aggregate demand. According to the International Monetary Fund (1999), the outlook for Singapore in terms of real GDP growth is 1.5 per cent in 1998, 0.5 per cent in 1999 and 4.2 per cent in 2000.

**FIGURE 16 AIR CARGO SPACE SUPPLY AND DEMAND TO SINGAPORE—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

Although the Singaporean market has been affected by the Asian crisis (with growth reduced from levels above seven per cent previously enjoyed), the effect on the economy has been relatively small compared with other Asian countries.

Over the short term, Supermarket to Asia (1998c) predict that food imports to Singapore will fall as a result of depressed consumer demand and business confidence. However, Singapore is not an economy based on large domestic food production, and will remain a large food importer. Singapore is also one of the wealthiest economies in Asia, with very few trade barriers. These two factors should see food imports from Australia remain relatively strong over the next two years. This trend should persist in the medium term as higher per capita income and a large tourist trade increase demand for western food.

#### *Demand for air freight capacity*

As stated earlier, it is envisaged that Singapore real GDP will remain marginally positive in 1999 before recovering in 2000 (with growth of 4.2 per cent). As a result, it is unlikely that exports from Australia will remain strong in 1999; however, it is reasonable to assume that exports to Singapore will improve during 2000 due to the stronger economic growth.

The following scenario for export quantities to Singapore has been developed by combining some assumptions about the market with Singapore's economic performance, food export opportunities identified by Supermarket to Asia and Australian air freight exports to Singapore during the last three years. With lower consumer demand, partly offset by the lack of domestic food production, it is assumed that Australian food exports to Singapore will fall marginally in 1999 (by one per cent). In 2000, as the economy recovers, food exports are expected to rise (by four per cent) as consumer demand for imported commodities increases.

'Other' commodity groups made up less than 30 per cent of the total air exports to Singapore and have become less important over the three-year period. It is difficult to predict how exports of these commodities will change in the near future as fluctuations in the levels of 'other' exports appear to bear little relationship to economic growth trends. With Singapore recording strong economic growth in 1997, 'other' commodities fell by 14 per cent, yet these exports were only marginally affected when economic growth fell substantially in 1998. Therefore, in the absence of better information, it has been conservatively assumed that the level of these exports would remain unchanged over the next two years.

The results of these assumptions on total demand for air freight capacity are shown in table 13.

**TABLE 13 SCENARIO OUTLOOK FOR AIR FREIGHT TO SINGAPORE**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	7.5	8.0	1.5	0.5	4.1
Food (annual % change)		12	0	-1	4
Other (annual % change)		-14	-3	0	0
Food (tonnes)	32 006	35 968	35 886	35 500	36 900
Other (tonnes)	16 124	13 866	13 408	13 400	13 400
Total (tonnes)	48 130	49 834	49 294	48 900	50 300

Sources: International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

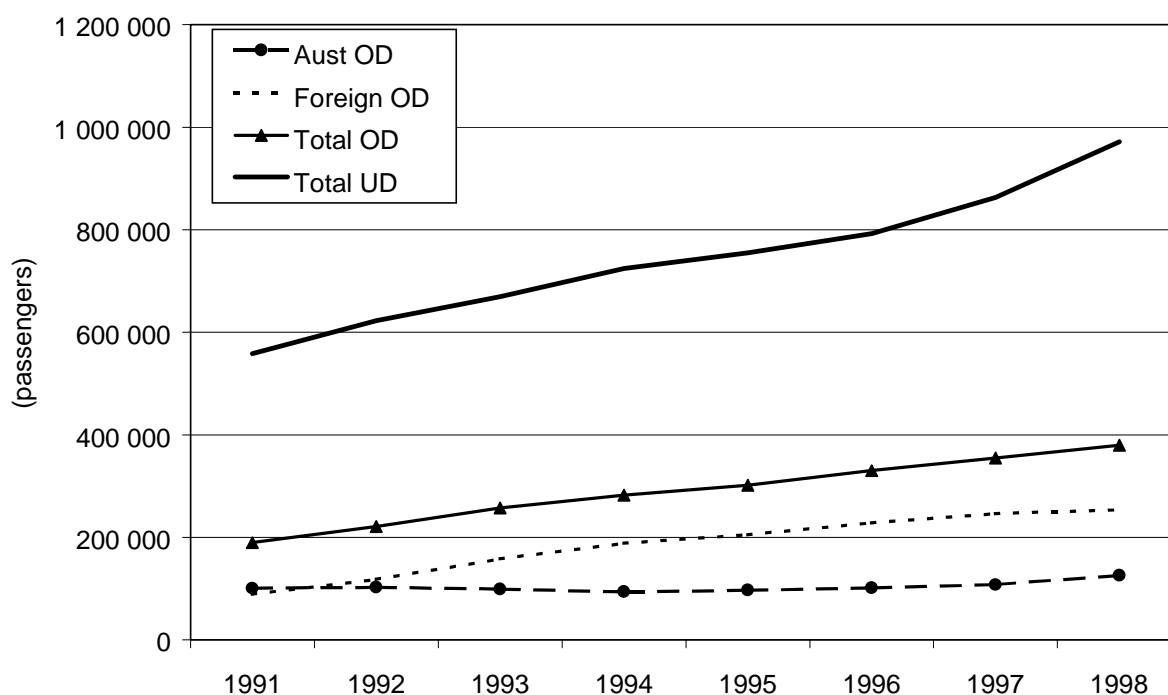
The Australia–Singapore aviation market is served mainly by passenger aircraft. During 1998, approximately 95 per cent of total flights (6671 of 7015) were passenger flights, delivering 78 per cent of the air freight capacity. It is reasonable to assume that this market profile will remain relatively constant over the short- to medium-term. It is therefore necessary to form a view on the future supply of passenger services in order to produce an outlook for future air freight capacity. Supply of passenger services is determined by passenger demand and government regulations. Currently there is adequate capacity in the Australia–Singapore bilateral air service agreement for airlines to introduce additional services if demand warrants it.

An eight-year time series of origin–destination traffic between Australia and Singapore illustrates the evolution of the passenger market in recent times (figure 17). Between 1991 and 1998, foreign visitors to Australia grew at an average annual

rate of 16 per cent, while Australians visiting Singapore grew at a rate of only three per cent. The foreign market quickly outgrew the Australian passenger (OD) market, which can be seen by the crossover of Australian and foreign OD lines during 1991. The Asian crisis appears to have had little impact on demand for travel between these two markets, with both foreign and Australian OD traffic continuing to increase in 1998.

Uplift and discharge passengers have consistently far outnumbered origin-destination passengers, a gap that has widened since 1996. This reflects the role of Singapore as a major regional hub for flights to Europe or other Asian destinations.

**FIGURE 17 AUSTRALIA-SINGAPORE AIR PASSENGER MARKET—1991-1998**



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

The Tourism Forecasting Council (1999) predicts that visitor arrivals from Singapore will fall by two per cent in 1999 and recover with seven per cent growth in 2000. In line with the general economic prognosis for Singapore, and according to the Tourism Forecasting Council predictions, it is assumed that Singaporean visitors to Australia will decline by two per cent in 1999 before recovering by seven per cent in 2000.

Australian OD passengers grew at a rate of seven per cent in 1997 and 16 per cent in 1998. As a result of these strong Australian OD passenger numbers it is assumed that Australians visiting Singapore will continue to grow by seven per cent in both 1999 and 2000. This results in a scenario of increasing demand for seats in both 1999 (one per cent) and 2000 (seven per cent).

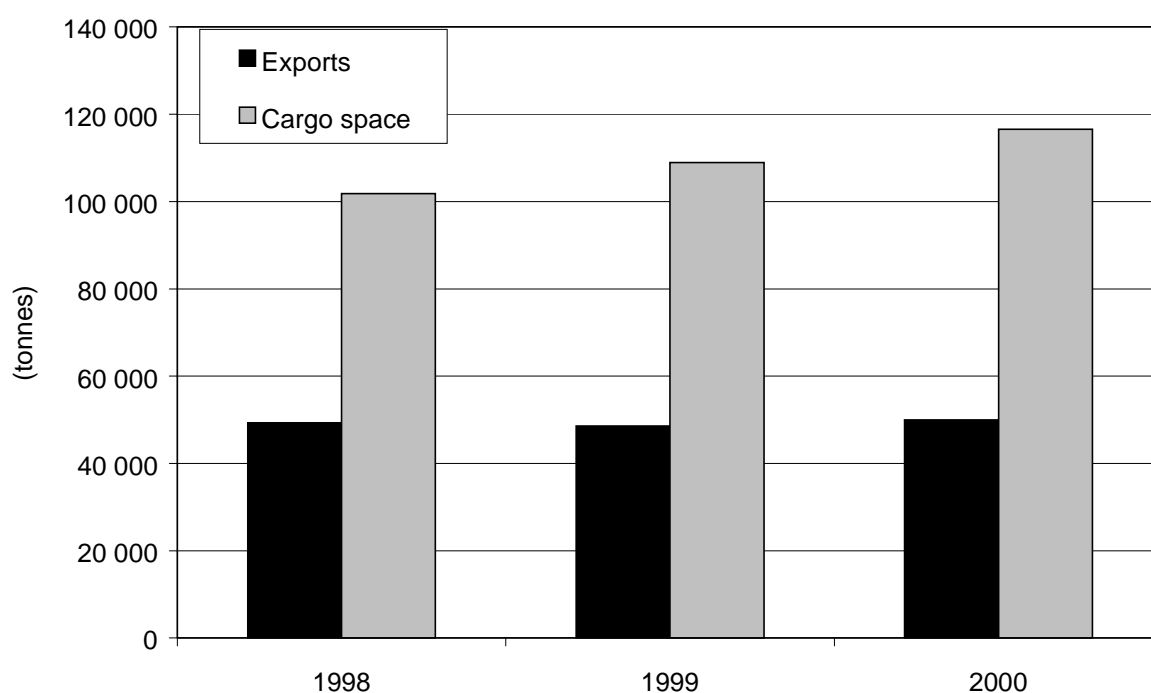
Due to the strength of the UD market between Australia and Singapore, the outlook must focus on traffic uplifted and discharged. The average annual growth of UD traffic for the past four years has been seven per cent. Hence, UD traffic growth of seven per cent has been assumed for both 1999 and 2000. These assumptions generate a net number of UD passengers in the Australia–Singapore market of 1 007 000 in 1999 (an increase of 66 000 seats) and 1 078 000 in 2000 (an increase of 71 000 seats).

In translating seats into cargo capacity it has been assumed that the percentage of direct flights and load factors remain unchanged. It has also been assumed that the airlines do not change their fleet composition. Using these assumptions, the change in cargo capacity is equivalent to the change in seat capacity. Thus, under this scenario, it is assumed that cargo capacity will increase by seven per cent in both 1999 and 2000.

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998 (figure 18). If the scenario assumptions are reasonably accurate, it appears that exporters will not face any constraints in obtaining cargo capacity in the short- to medium-term. There would be an adequate supply of cargo capacity to match any sharp changes in demand for cargo space.

**FIGURE 18 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO SINGAPORE—1999–2000**

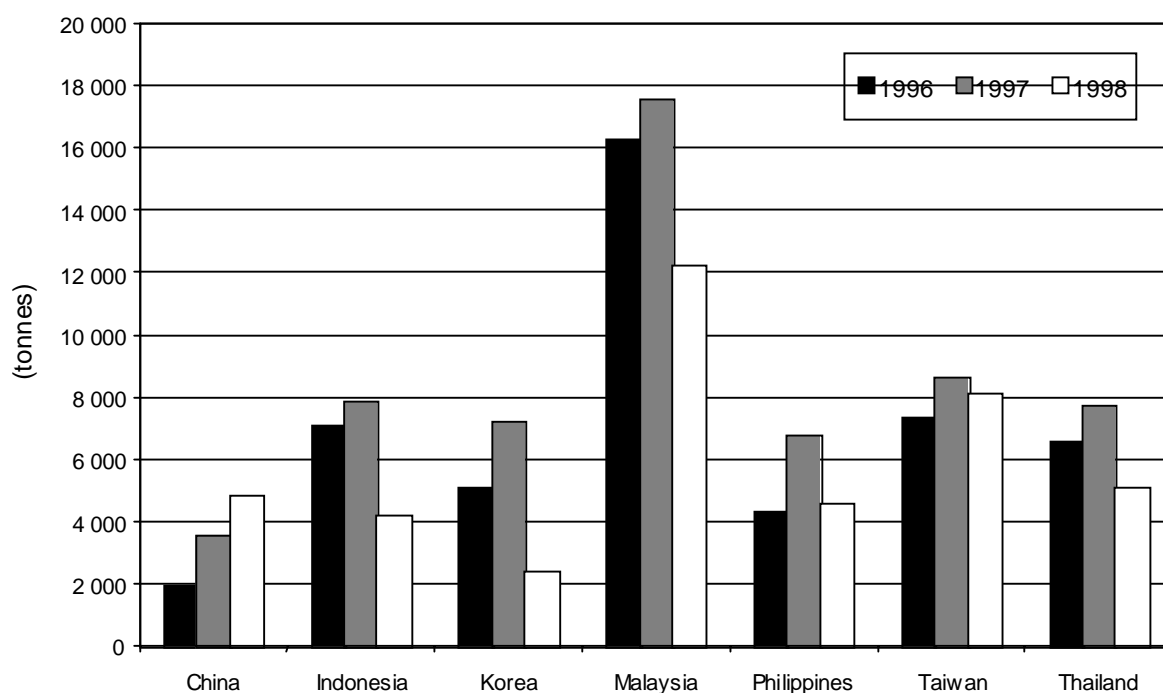


Source BTE analysis.

## ANALYSIS OF THE 'MEDIUM' MARKETS

In 1998, China, Indonesia, the Republic of Korea, Malaysia, Philippines, Taiwan and Thailand, between them received about 23 per cent of all the air freight exports from Australia to the twelve Asian countries considered in this study. All seven markets show different profiles over 1996 to 1998. The effect on demand for Australian exports due to the financial crisis is in part evident from figure 19, which shows the size of these seven markets (in terms of export volumes 'unloaded').

**FIGURE 19 AIR FREIGHT EXPORTS TO THE 'MEDIUM' ASIAN MARKETS—1996–1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

## China

### *Exports (by air)—1996–1998*

China is a relatively new and emerging market for Australia in terms of air exports. It has quickly grown to become one of Australia's 'medium'-sized markets, receiving approximately 4808 tonnes of Australian exports in 1998<sup>22</sup>. The rapid growth of China as a market for Australian exports (with year-on-year increases of 84 and 36

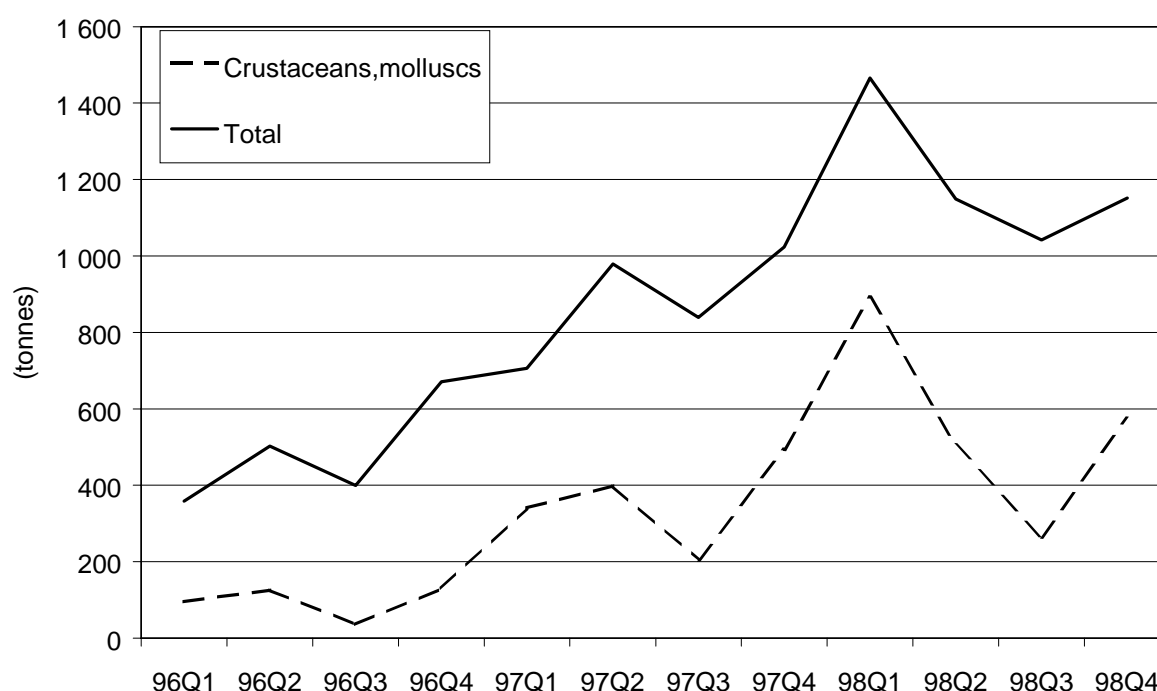
<sup>22</sup> 4808 tonnes of air freight were flown from Australia and 'unloaded' in China in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, 5375 tonnes were recorded by freight forwarders/exporters as 'destined' for China in 1998. In other words, 567 tonnes (or approximately 11 per cent) were indirectly forwarded to China through other markets (such as Hong Kong).

per cent respectively for 1997 and 1998) indicate that this market has been relatively unaffected by the financial crisis.

### Major export groups

*Crustaceans, molluscs* have consistently been the top Australian export commodity to China over the last three years, representing 47 per cent (2238 tonnes) of the total in 1998 (up from only 20 per cent in 1996). This rapid growth was not affected by the Asian crisis, with exports growing by 56 per cent in 1998. Figure 20 illustrates the dominance of the *crustaceans, molluscs* category in total commodity exports to China. Trends in total exports clearly reflect changes in demand for this commodity group. Figure 20 also shows large quarterly variations in *crustaceans, molluscs*, but a consistent pattern has not yet emerged. There are expectations that the consumption of seafood in China will increase further. Supermarket to Asia expects China to become the largest importer of seafood during the next few years. They estimate that demand is increasing by two kilograms (per capita) per annum. (Supermarket to Asia, 1998d). This will reinforce the position of *crustaceans, molluscs* as the major commodity group exported to China over the coming years.

**FIGURE 20 AIR FREIGHT EXPORTS TO CHINA—1996–1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### Food Exports

Seven of the top 15 commodity groups exported to China in 1998 were food. Food items have consistently dominated the market, accounting for approximately 63 per cent of total commodities in 1998.



Apart from *crustaceans, molluscs*, the other major food commodities exported by air were *meat, preserved crustaceans, fresh vegetables, dairy products, miscellaneous edible* and *fresh fruit*. Of these food groups, only *fresh fruit* suffered a decline (54 per cent) in the level of exports during 1998. All other food commodities enjoyed strong, and in some cases phenomenal, growth over the period (although much of this was due to low starting bases).

Table 14 sets out changes in the level of exports to China between 1996–98.

**TABLE 14 MAJOR COMMODITIES EXPORTED BY AIR TO CHINA—1996–1998**

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Crustaceans,molluscs	96	126	36	130	341	399	204	494	892	506	265	575
Other	129	144	202	243	225	250	278	214	114	148	227	215
Other commodities	12	8	13	111	10	40	62	71	72	50	86	82
Meat	65	32	42	50	26	42	30	36	26	47	53	51
General industrial	14	12	11	17	7	29	21	24	21	37	25	29
Miscellaneous edible	7	13	40	24	25	16	30	20	41	25	17	28
Misc manufactured	5	10	9	6	10	12	18	14	9	13	27	28
Crustaceans preserved	2	2	2	2	6	23	29	15	37	54	41	27
Textiles	7	14	5	14	5	13	10	17	19	13	17	19
Machinery specialised	5	69	20	12	8	22	19	9	15	24	18	18
Paper, paperboard etc	5	20	3	3	3	18	3	2	9	22	14	18
Vegetables fresh	0	0	0	1	0	4	2	0	15	13	94	16
Professional & scientific	6	4	4	5	1	8	8	9	4	20	7	15
Live animals	0	45	6	47	0	1	29	3	101	91	140	15
Dairy products	4	4	6	5	0	5	9	12	19	14	13	13
Fruit fresh	1	0	0	2	39	99	89	85	73	72	0	0
<b>Total</b>	<b>358</b>	<b>502</b>	<b>399</b>	<b>671</b>	<b>706</b>	<b>979</b>	<b>839</b>	<b>1 024</b>	<b>1 466</b>	<b>1 149</b>	<b>1 042</b>	<b>1 151</b>

*Note* Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### ***Airlines, flights and cargo capacity***

During 1998, five airlines operated direct services between Australia and China—Air China, Ansett International, China Eastern, China Southern, and Qantas. However, China Southern withdrew its services after the first quarter of the year.

There were 729 flights available to this market in 1998, all of which used passenger aircraft. The belly-hold freight capacity provided on these passenger services was 6100 tonnes.<sup>23</sup> The total number of flights operated by the airlines fluctuated from

<sup>23</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load

quarter to quarter but, overall, there was a 29 per cent decline from the first to the last quarter of 1998. This decline was also reflected in the supply of seats (which fell 27 per cent) and cargo space (which fell 18 per cent). These changes were a result of the exit of China Southern and Qantas adjusting its Boeing 767 flights throughout the year.

Table 15 traces the changes in the number of flights and cargo capacity by aircraft type.

**TABLE 15 ESTIMATES OF CARGO SPACE AVAILABLE TO CHINA—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A340	39	39	39	39	156
	B747	52	52	52	52	208
	B767	117	82	109	57	365
	Total	208	173	200	148	729
Seats	Passenger	52 000	43 000	49 000	38 000	182 000
Cargo capacity (t)	Passenger	1 700	1 500	1 500	1 400	6 100
	Freighter	0	0	0	0	0
	Total	1 700	1 500	1 500	1 400	6 100

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

*Source* BTE estimates.

### *Alignment of supply and demand—1998*

A comparison of the cargo space supply and demand provided to the China–Australia market provides a first order assessment of any pressures that may exist on international air freight services between these countries. This comparison should identify any possible problem areas with the air freight logistics chain to China.

Figure 21 illustrates the quarterly cargo space supply and demand on passenger flights to China during 1998. It is clear that the demand for cargo space to China has been met by the current supply of passenger services. However some pressure is evident in the first quarter with 86 per cent of capacity being utilised.<sup>24</sup> During the first quarter some exporters may have faced constraints in obtaining guaranteed

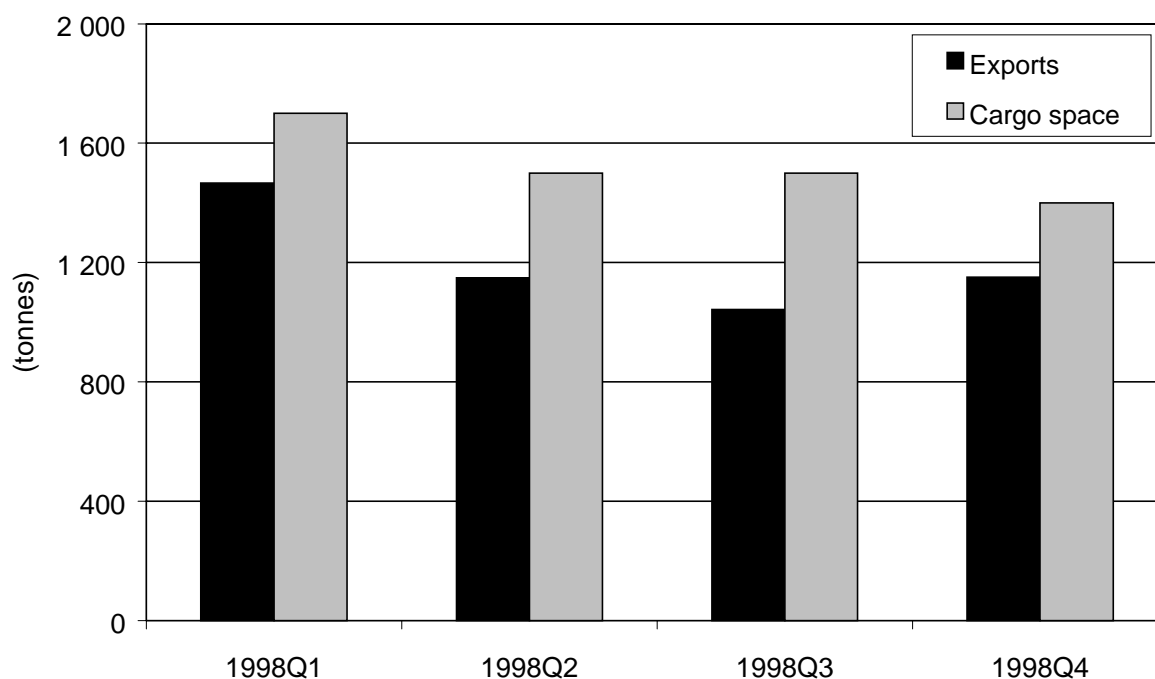
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assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

<sup>24</sup> The work of Douglas and Miller (1974) was drawn on in interpreting whether or not an 86 per cent overall cargo capacity utilisation (China 1<sup>st</sup> quarter 1998) represents an air freight network approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to encounter capacity constraints in the overall network. As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.

cargo space on desired flights. For the remainder of the year, exporters were utilising between 69 and 82 per cent of the available cargo capacity in each quarter.

**FIGURE 21 AIR CARGO SPACE SUPPLY AND DEMAND TO CHINA—1998**



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

A definite view on the future air freight capacity supply and demand to China is difficult to establish because of the multitude of variables affecting the air freight sector. However, by exploring a scenario for air freight capacity it is possible to establish how the market might develop under certain assumptions. The outcome of this scenario is used as indicative or illustrative of the future conditions in the market. The following sections develop such a scenario.

#### ***China's economy and prospects for food exports***

The outlook for the Chinese economy (population 1200 million, GDP per head \$ US 800)<sup>25</sup> is for a slight slowing of economic growth due to a reduction in exports to other Asian countries. According to the International Monetary Fund (1999), the outlook for China in terms of real GDP growth is 7.8 per cent in 1998, 6.6 per cent in 1999 and 7.0 per cent in 2000. Unlike other Asian countries, the Chinese economy has been relatively unaffected by the Asian crisis, recording slower but still strong economic growth. This is likely to continue over the short- to medium-term.

<sup>25</sup> Supermarket to Asia (1999d), J.P. Morgan (1999).

In the short term, food exports to China are expected to increase, but at a lower rate than previous years as aggregate demand is dampened in response to falling Chinese exports to Asia. However, in the medium term, growth in exports is expected to further increase as China manoeuvres itself into a position to join the World Trade Organisation, undertaking economic and financial reform such as lowering trade barriers. China also has the world's largest population, providing huge future opportunities for trade expansion. As a result of these factors, Supermarket to Asia (1998d) envisage China to grow in importance as a destination for Australian food and beverage exports in the future.

#### *Demand for air freight capacity*

As stated earlier, real GDP for the Chinese economy is forecast to remain relatively strong, experiencing only a small reduction in the rate of growth over the next few years. This positive economic outlook provides the expectation that Australia's exports to China will also remain relatively strong over the short- to medium-term.

Food items exported to China have exhibited rapid growth over the last three years, with growth rates of 201 per cent in 1997 and 46 per cent in 1998. In 1998, food items represented 63 per cent of total exports to China, up from 59 per cent in 1997 and 36 per cent in 1996. Clearly, the food sector represents an important set of commodities in forming a view on the future demand for air freight capacity to China.

The new and emerging nature of the Chinese market makes it difficult to predict how Australia's food exports will be affected by the economic growth forecast for China through to 2000. Supermarket to Asia (1998d) assumes China's food imports will remain subdued over the short term, but will continue to grow strongly over the medium term. China is expected to begin freeing up its domestic market in a bid to join the World Trade Organisation. As a result of these expectations, GDP forecasts and historical export growth it is assumed that China will import roughly an additional 1000 tonnes of food from Australia in 1999 and a further 1500 tonnes in 2000. Absolute quantities of growth rather than growth rates are examined because of the highly variable nature of this market. This results in a scenario of around 4000 tonnes of food exports to China in 1999 (33 per cent growth) and 5500 tonnes in 2000 (37 per cent growth).

'Other' commodity groups represented 37 per cent of air exports to China in 1998 but have consistently declined in terms of proportional share during the period, growing by 19 per cent in 1997 and 21 per cent in 1998. Similar growth rates are expected over the next two years as the economy continues to enjoy solid growth. As a result, it is assumed that 'other' exports will grow by 20 per cent both in 1999 and 2000.

The results of these assumptions on total demand for air freight capacity are shown in table 16.

TABLE 16 SCENARIO OUTLOOK FOR AIR FREIGHT TO CHINA

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	9.6	8.8	7.8	6.6	7.0
Food (annual % change)		201	46	33	37
Other (annual % change)		19	21	20	20
Food (tonnes)	691	2 079	3 027	4 000	5 500
Other (tonnes)	1 239	1 468	1 781	2 100	2 600
Total (tonnes)	1 930	3 547	4 807	6 200	8 100

Sources International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

The Australia–China aviation market is currently served solely by passenger aircraft. For how long this will continue is uncertain, but in the short- to medium-term future it is expected that this profile will remain unchanged. Consequently, trends in the passenger market have to be examined to form an outlook on future belly-hold freight capacity to China. Supply of passenger services is determined by both market demand and government regulations. There is presently unutilised capacity within the air service agreement for passenger services and dedicated freight services are permitted if warranted by demand.

An eight-year time series of origin–destination traffic between Australia and China illustrates the evolution of the passenger market in recent times (figure 22). Between 1991 and 1998 Chinese visitors grew at an average annual rate of 25 per cent, while Australian residents visiting China grew at an average annual rate of 28 per cent. Figure 22 shows that the number of Australians visiting China has consistently exceeded Chinese visitors to Australia since 1992. The divergence between foreign and Australian OD traffic widened during the mid 1990s but have been running roughly parallel to each other since 1996, with strong growth in both markets.

A close examination of figure 22 reveals several interesting characteristics. Since 1994, UD and OD passenger numbers have moved together in parallel. Prior to 1994, the market was served by a limited number of direct flights as shown by the flat and declining UD numbers. At the same time OD numbers grew strongly, suggesting that the majority of passengers flew to China on indirect services, most likely through Hong Kong. From 1994 to 1996 there was a steady increase in the number of UD passengers, reflecting an increase in the number of direct flights serving the market. In 1996, there was a sharp increase in UD passengers flying to China, narrowing the gap between UD and OD traffic as more direct flights were offered by the airlines in line with bilateral negotiations between Australia and China.

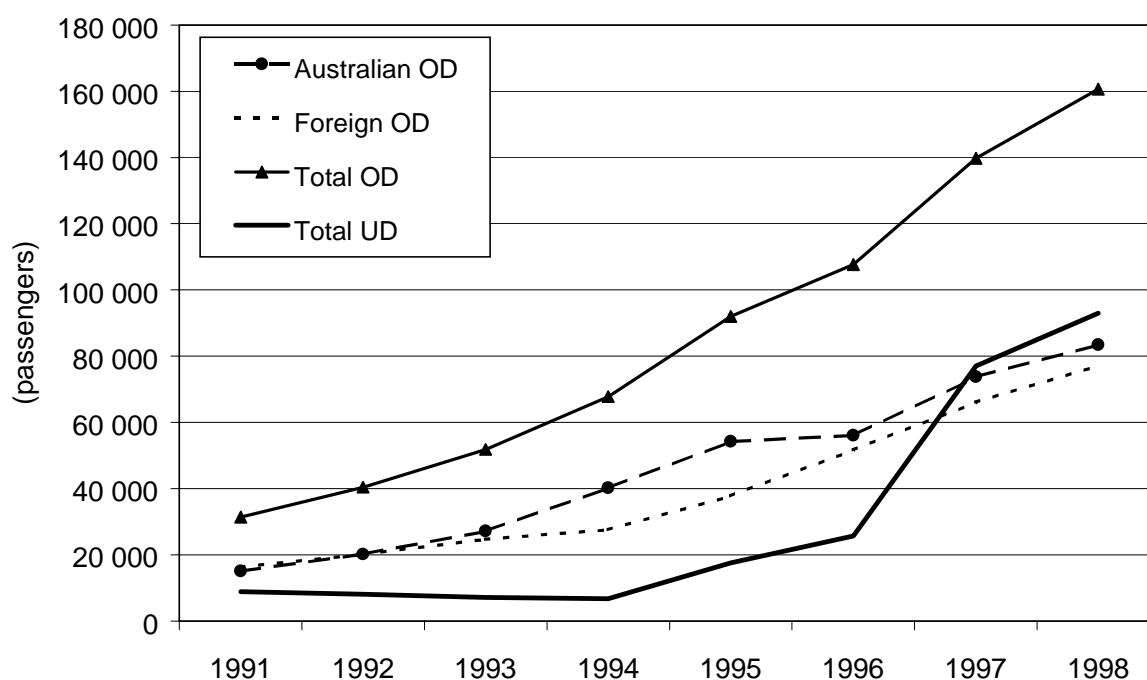
The Tourism Forecasting Council (1999) predicts average annual growth of 21 per cent for Chinese visitors to Australia over the next ten years. It predicts growth rates of 19 and 38 per cent for 1999 and 2000. Using these growth forecasts, it is assumed that Chinese visitors to Australia will continue to increase at these rates through to 2000.

Australian OD passengers grew by 32 per cent in 1997 and 13 per cent in 1998. As a result of this variation it is assumed that the annual average growth rate of 28 per cent between 1991 and 1998 will continue for both 1999 and 2000.

In line with the general economic prognosis for China, historical market demand and the Tourism Forecasting Council (1999) forecasts, it is assumed that both foreign and Australian OD traffic will continue to increase through to 2000. Combining these assumptions produces a total scenario of demand for seats increasing by 24 per cent in 1999 and 33 per cent in 2000.

In translating seats to cargo capacity it has been assumed that the percentage of direct flights and load factors remain relatively unchanged. Finally, it is also assumed that the airlines do not change their fleet composition. Taking all these assumptions into account, the change in cargo capacity is roughly equivalent to the change in seat capacity. Thus, under this scenario, it is assumed that cargo capacity will increase by 24 per cent in 1999 (to 7600 tonnes) and 33 per cent in 2000 (to 10 000 tonnes).

FIGURE 22 AUSTRALIA-CHINA AIR PASSENGER MARKET—1991-1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

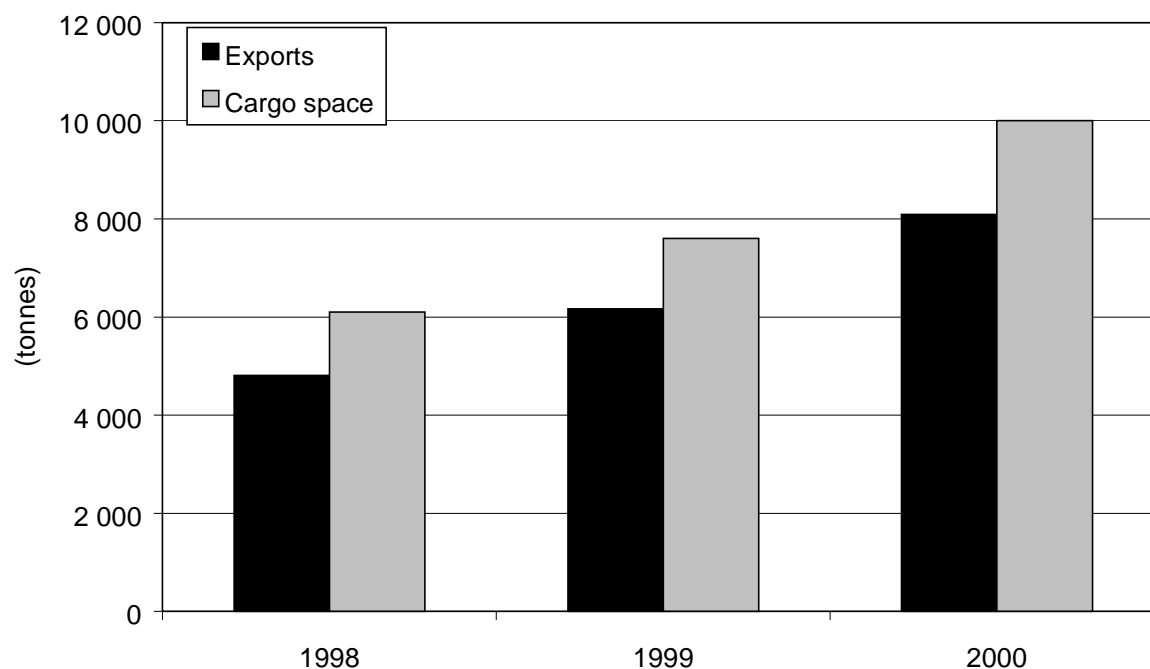
Source Department of Transport and Regional Services, AVSTATS, (1999).

### Implications for air freight supply and demand

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998 (figure 23). It was noted earlier that the Australia-China market might have faced some seasonal capacity problems during the 1998 calendar year (first quarter in particular).

Conditional upon the assumptions made, the scenario for 1999 indicates that these seasonal pressures are likely to continue. While there is no serious problem, utilisation rates of around 80 per cent imply that the market is experiencing some pressure. As a result, some exporters may continue to face seasonal difficulties in obtaining cargo space on scheduled passenger aircraft flights of their choice.

**FIGURE 23 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO CHINA—1999–2000**



Source BTE analysis.

## Indonesia

### *Exports (by air) — 1996–1998*

Indonesia is an averaged-sized ‘medium’ market for Australian air exports. In 1998, 4193 tonnes of Australian commodities were exported by air to Indonesia.<sup>26</sup> This quantity represents a dramatic decline (approximately 46 per cent) compared to 1997 when 7816 tonnes were exported. The severity of the Asian crisis in Indonesia is apparent in these export figures. Indonesia’s currency lost more than 80 per cent of its value during 1998 and GDP fell by more than 13 per cent.

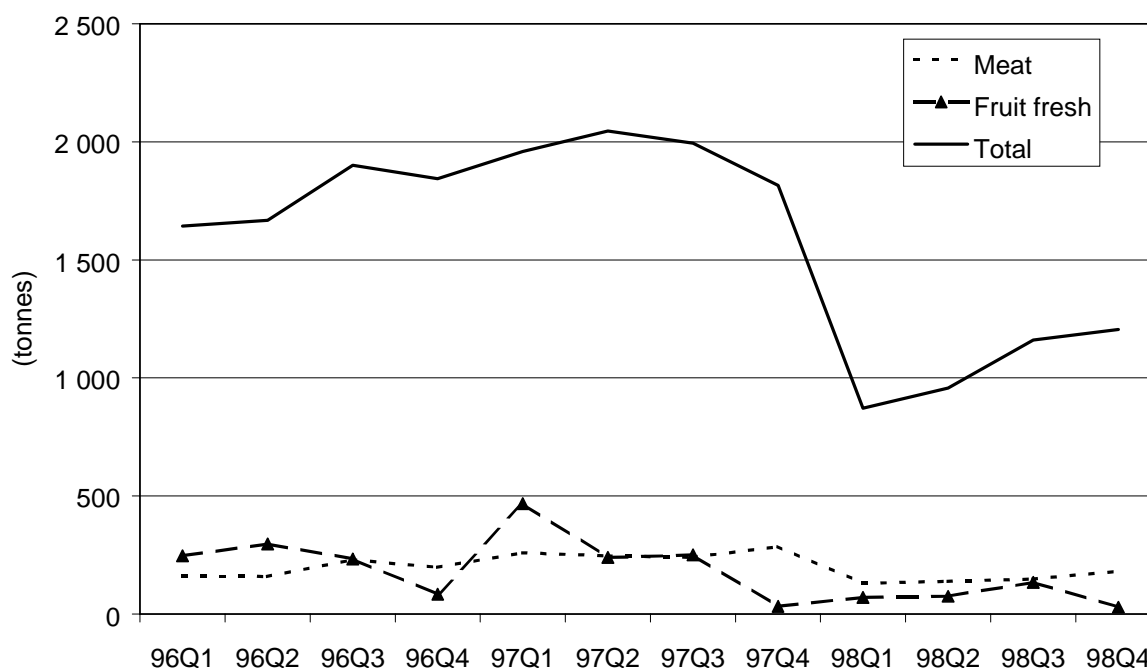
<sup>26</sup> 4193 tonnes of air freight were flown from Australia and ‘unloaded’ in Indonesia in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, 4283 tonnes were recorded by freight forwarders/exporters as ‘destined’ for Indonesia in 1998. In other words, 90 tonnes (or two per cent) went to Indonesia via other countries (on indirect flight routings).

*Major export groups*

Over the last three years, *meat* and *fresh fruit* have been the top two commodity groups exported by air to Indonesia (together representing 22 per cent of total exports in 1998). *Meat* exports represented 14 per cent of total exports in 1998, increasing slightly from 11 per cent in 1996. The demand for *meat* grew substantially (38 per cent) in 1997 but fell by 42 per cent in 1998 as the financial crisis slashed consumption of imports. *Fresh fruit* also enjoyed considerable growth in 1997 (15 per cent) but dropped by 69 per cent in 1998 (991 to 311 tonnes). As a result, the share of *fresh fruit* declined from 12 per cent in 1996 to seven per cent in 1998. Most of Australia's commodity exports to Indonesia fell by similar proportions in 1998.

*Preserved fruit* and *beverages* were among the very few commodities to experience growth in 1998 (increasing by 382 per cent and 68 per cent respectively) but these were both from relatively low bases and remain only a small proportion of total exports. Figure 24 illustrates a three-year quarterly history of exports of these major commodity groups. It clearly shows the dramatic impact of the Asian crisis affecting Australian exports in the first quarter of 1998.

**FIGURE 24 AIR FREIGHT EXPORTS TO INDONESIA—1996–1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

*Food exports*

Major food items comprised five out of the top 15 commodity export groups in 1998, consistently representing more than 30 per cent of total air freight to Indonesia.



In addition to the top commodities (*meat* and *fresh fruit*), Australia also exported *beverages*, *preserved fruit* and *dairy products*. The growth trends in *beverages* and *preserved fruit* have been discussed. *Dairy products* have declined significantly over the period, falling by 30 per cent in 1997 and a further 46 per cent in 1998.

Table 17 provides more detail on the quantities of various commodity groups exported to Indonesia over 1996–98.

**TABLE 17 MAJOR COMMODITIES EXPORTED BY AIR TO INDONESIA—1996–1998**

	1996	1996	1996	1996	1997	1997	1997	1997	1998	1998	1998	1998
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	(tonnes)											
Other commodities	138	47	83	108	79	77	415	443	211	206	300	327
Meat	163	159	230	198	260	246	240	285	130	139	149	182
General industrial	50	49	65	64	39	112	90	70	37	76	45	71
Fruit preserved	17	15	23	25	14	5	6	6	2	69	9	71
Beverages	2	7	4	12	14	7	7	57	8	15	52	69
Machinery specialised	30	54	78	65	59	85	57	45	34	34	39	38
Dairy products	122	126	105	131	95	108	77	56	24	92	30	35
Fruit fresh	248	297	234	84	468	240	251	33	71	76	135	30
Electrical	31	55	31	35	38	76	64	38	24	23	27	24
Misc manufactured	35	46	53	47	35	64	45	49	34	18	18	22
Articles of apparel	6	12	13	14	11	24	17	17	15	12	17	21
Metalworking machinery	2	5	33	6	9	16	15	12	8	15	20	15
Manufactures of metal	13	15	7	20	32	24	21	44	19	20	36	13
Textiles	19	24	22	24	20	12	28	30	9	14	22	12
Paper, paperboard etc	8	8	10	13	11	23	17	1	43	27	2	5
Other	761	749	910	998	777	925	646	629	203	121	261	271
Total	1 644	1 667	1 901	1 844	1 960	2 046	1 995	1 815	871	957	1 160	1 205

*Note* Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### ***Airlines, flights and cargo capacity***

Seven airlines—Sempati Air, Merpati, Qantas, Ansett International, Garuda, Thai Airways International and Martinair—flew either directly or indirectly between Australia and Indonesia in 1998. However, Sempati Air, a private Indonesian airline, ceased operations in June 1998 when it was unable to meet lease repayments in US dollars due the slump in the value of the rupiah. Merpati, a government owned Indonesian airline, took over some of Sempati's services, but also suffered serious financial problems causing it to return aircraft and cut routes and frequencies during 1998. Falling load factors and US dollar lease repayments also forced Garuda, Indonesia's national flag carrier, to return most of its leased aircraft, causing it to drop routes and reduce frequencies. Martinair, a Dutch dedicated freight airline with

services worldwide, stopped operating their weekly service from Sydney to Jakarta after the first quarter of 1998. Australian based airlines, Qantas and Ansett, also reduced routes and frequencies to Indonesia during 1998.

In total, there were 4058 flights available to Indonesia in 1998, of which 4045 (99.7 per cent) used passenger aircraft and the remaining 13 used dedicated freighters. The dedicated freight service made available around 700 tonnes of cargo space in the first quarter, which represented two per cent of the total annual capacity of 35 700 tonnes, but six per cent of capacity in the first quarter. In terms of number of flights, dedicated freight flights represented only 0.3 per cent of total flights for the year or one per cent in the first quarter of 1998.

During the course of 1998, the number of flights from Australia to Indonesia fell from 1102 in the first quarter to 880 in the fourth quarter (a 20 per cent decline). The number of seats and the available cargo space experienced even larger falls (29 and 38 per cent respectively).<sup>27</sup> The bulk of the reduction in flights and seats occurred in the last quarter of 1998, but the decline in cargo space took place largely in the second quarter of 1998. This was a result of the exit of the dedicated freighter and a large drop in the use of McDonnell Douglas MD11 aircraft in favour of the much smaller Boeing 737 in the second quarter, and large falls in the use of all aircraft (except the Boeing 767) in the fourth quarter.

Table 18 summarises the quarterly breakdown of flights and cargo capacity by aircraft type. It clearly shows the large reductions in the number of flights, seats and cargo space and the move away from operating larger aircraft in favour of smaller ones.

#### *Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to Indonesia) with the amount of available export cargo space in 1998 provides a first-order assessment of the existence or extent of any demand pressures in the air freight link of the logistics chain between Australia and Indonesia.

Figure 25 shows the quarterly air freight supply and demand to Indonesia in 1998. It shows no sign of any capacity constraint in the Australia-Indonesia market. Capacity utilisation rates are below 20 per cent; even comparing 1997 pre-crisis exports levels to the reduced 1998 available cargo space still only results in utilisation rates averaging 25 per cent. This indicates that falls in passenger demand for flights and seats were mirrored in exporter's demand for cargo space.

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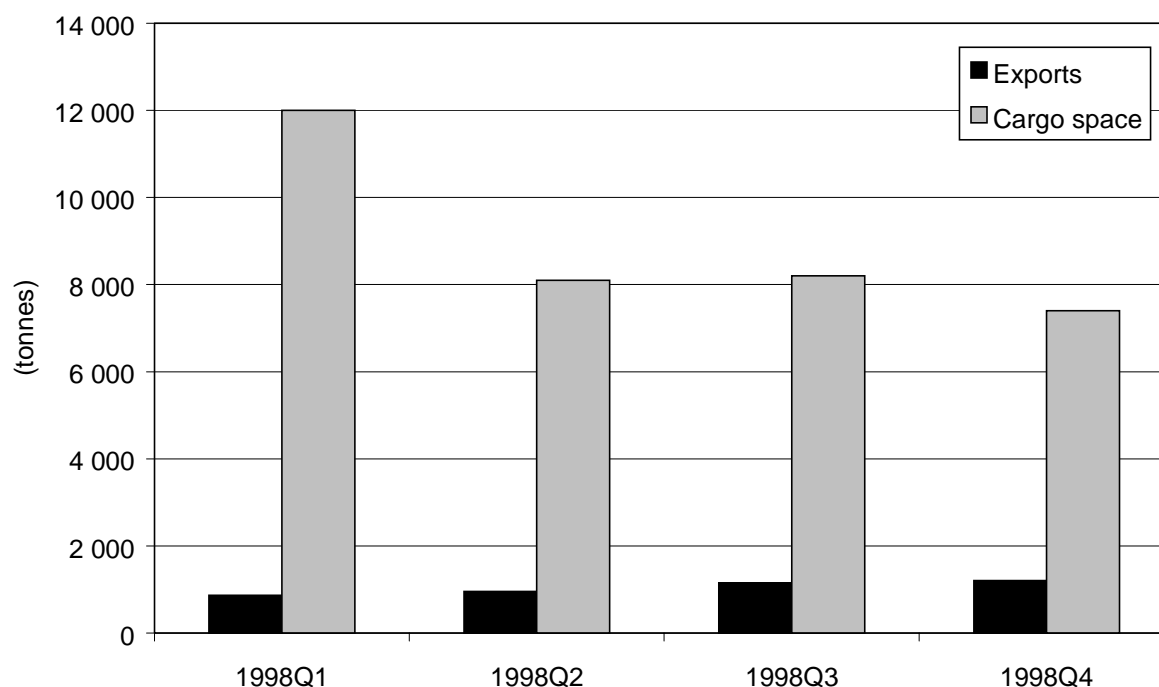
<sup>27</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

**TABLE 18 ESTIMATES OF CARGO SPACE AVAILABLE TO INDONESIA—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	DC10	91	0	0	30	121
	MD11	182	39	39	9	269
	L1011	0	0	0	50	50
	B737	182	351	351	321	1 205
	B747	169	189	195	85	638
	B767	286	225	156	226	893
	A300	65	0	0	0	65
	A310	78	90	117	27	312
	A320	36	30	34	32	132
	A330	0	130	130	100	360
	B747F	13	0	0	0	13
	Total		1 102	1 054	1 022	880
Seats	Passenger	256 000	228 000	222 000	182 000	888 000
Cargo capacity (t)	Passenger	11 300	8 100	8 200	7 400	35 000
	Freighter	700	0	0	0	700
	Total	12 000	8 100	8 200	7 400	35 700

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

**FIGURE 25 AIR CARGO SPACE SUPPLY AND DEMAND TO INDONESIA—1998**

Source BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

The multitude of variables required to definitely predict future air freight capacity supply and demand to Indonesia puts the task beyond the scope of this study. Using certain assumptions about the Indonesian market, however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this scenario analysis can then be used as a guide to future supply and demand under the conditions assumed.

The following sections develop such a scenario<sup>28</sup>.

#### *Indonesia's economy and prospects for food exports*

The outlook for the Indonesian economy (population 200 million and GDP per capita \$US 400 in 1998)<sup>29</sup> is poor—economic growth will remain severely affected by the financial crisis in the short term with a return to a positive rate of growth in 2000. Indonesia has been the country worst affected by the financial crisis having the most dramatic falls in GDP growth, massive currency depreciations (more than 80 per cent), rapidly rising unemployment (in excess of 20 per cent) and skyrocketing inflation (more than 75 per cent). According to the International Monetary Fund (1999), the outlook for Indonesia in terms of real GDP growth is -13.7 per cent in 1998, -4.0 per cent in 1999 and 2.5 per cent in 2000. Pre-crisis growth rates for Indonesia were eight per cent in 1996 and almost five per cent in 1997.

The economic turmoil in Indonesia has severely affected Australia's exports to the country. Currency volatility has seriously undermined business confidence and external debt is growing fast. Negative growth and the currency depreciation have combined to produce huge reductions in consumer purchasing power, thereby halting growth in the imported food market. Over the short term, Supermarket to Asia (1998e) predict that the severe economic situation will cause imported food to become very expensive while income levels continue to drop. This will mean a sharp contraction in demand for imported foods. Over the medium- to longer-term, Supermarket to Asia (1998e) anticipates that when Indonesia recovers, the imported food market will again enjoy strong growth. Factors expected to contribute to this recovery include Indonesia's large population, the deregulation of protected sectors (including foodstuffs, retail and wholesale distribution) and reduced food tariffs.<sup>30</sup> There remains, however, much uncertainty about when Indonesia will recover, because the crisis was both economic and political.

#### *Demand for air freight capacity*

Major food items have consistently represented more than 30 per cent of total air exports to the Indonesian market. While this proportion is not as large as for some

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<sup>28</sup> The scenario outlook for Indonesia was developed prior to the East Timor crisis of September 1999 and therefore does not reflect any changes in market demand or supply that may have resulted from the crisis.

<sup>29</sup> Supermarket to Asia (1999e), J.P. Morgan (1999).

<sup>30</sup> These measures are part of the IMF rescue package for Indonesia.

other countries, food items are important in formulating a scenario for future air freight capacity demand. It is important to note that food items not in the top 15 are classified in the 'other' category, meaning that the actual proportion of food exports is likely to be higher than 30 per cent. Detailed information on food exports (courtesy of Supermarket to Asia) makes it possible to separate major food commodity groups from the rest of exports. Supermarket to Asia (1998e) forecasts that food exports to Indonesia will continue to be constrained by economic difficulties.

As discussed, the outlook for the Indonesian economy is continued negative growth, with recovery beginning to emerge in 2000. Table 19 indicates that Australia's major food and 'other' exports to Indonesia fell dramatically in 1998 in response to the economic crisis. 'Other' exports, representing close to 70 per cent of air exports to Indonesia, increased by ten per cent in 1997, but fell by 47 per cent in 1998. Major food exports increased by 13 per cent in 1997, but fell by 44 per cent in 1998. The drastic decline in consumption of Australian food and 'other' exports is no surprise, considering the economic situation facing Indonesia. With such extreme falls and volatility in major macroeconomic variables, imported food became prohibitively expensive for most of the population.

As a result of this historical trade data, IMF growth forecasts and Supermarket to Asia's medium-term views, it is assumed that both food and 'other' exports to Indonesia will decline again in 1999 (by ten per cent) and resume growth (of ten per cent) in 2000. The rapid and severe nature of Indonesia's economic downturn may mean that it has hit rock bottom, and result in faster recovery rates for many macro variables. However, the severity of the crisis on the economic well-being of most of Indonesia's population means that the purchasing power of Indonesians is not expected to increase substantially for some time. As a result, the scenario is that food and 'other' imports will remain well below 1997 levels for 2000 and beyond.

Table 19 summarises the historical and projected scenario data for Indonesia.

**TABLE 19 SCENARIO OUTLOOK FOR AIR FREIGHT TO INDONESIA**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	8.0	4.7	-13.7	-4.0	2.5
Food (annual % change)		13	-44	-10	10
Other (annual % change)		10	-47	-10	10
Food (tonnes)	2 201	2 476	1 386	1 300	1 400
Other (tonnes)	4 856	5 340	2 808	2 500	2 800
Total (tonnes)	7 056	7 816	4 194	3 800	4 200

Sources: International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

Since the second quarter of 1998, the Australia-Indonesia aviation market has been served solely by passenger aircraft. In 1998, most flights were passenger services, providing 98 per cent of the air freight capacity available. Over the short- to medium-

term future, it is reasonable to assume that this market profile will not change significantly. To construct plausible scenarios for the future supply of freight capacity it is therefore imperative to do the same for the future supply of passenger services.

Future freight capacity growth is likely to occur largely in passenger aircraft, even allowing for the weekly dedicated freight service between Sydney and Jakarta to resume at some time in the future. The supply of passenger aircraft is determined by passenger demand and government regulations in the market, not the demand for freight capacity. There are no government limits on the growth of freight services—the Australia–Indonesia bilateral air service agreement currently has significant unutilised capacity in the passenger market and allows dedicated freight flights.

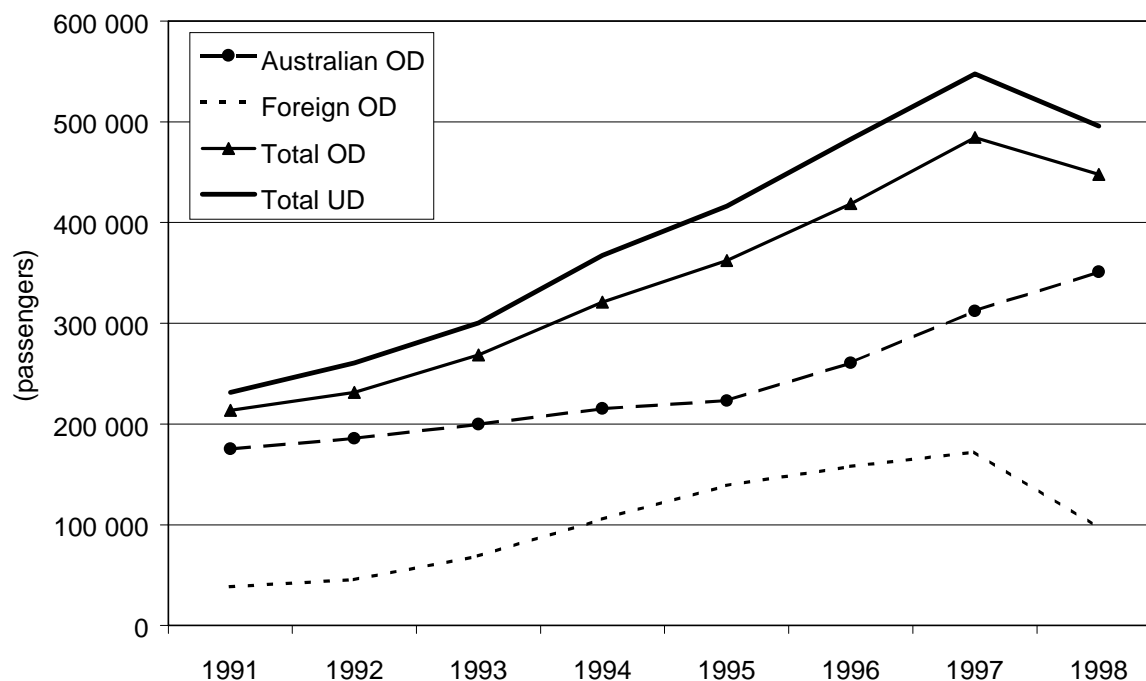
The evolution of the Australia–Indonesia passenger market is shown in figure 26, which displays an eight-year time series of origin–destination (OD) and uplift–discharge (UD) traffic between the countries. Indonesian visitors to Australia grew at an average annual rate of 28 per cent between 1991 and 1997, while Australians visiting Indonesia grew at a rate of ten per cent. The number of Australian visitors to Indonesia has consistently exceeded the number of Indonesians visiting Australia over the last eight years. In fact, Australians visiting Indonesia constituted more than 60 per cent of the origin–destination traffic in 1997.

The total number of Indonesian visitors to Australia fell by 44 per cent in 1998 (after nine per cent growth in 1997) reflecting the enormous impact of the Asian crisis on Indonesian's ability to travel. Australians visiting Indonesia continued to grow by 12 per cent in 1998 on top of 20 per cent growth in 1997. The depreciation in the value of the rupiah, making Indonesia a very cheap holiday destination, appears to have outweighed any discouraging impact the political and security situation may have had. Both OD and UD data reflect the downward trend in 1998 with the growth in Australians visiting Indonesia moderating the steep decline in foreign arrivals. Total OD traffic fell by eight per cent in 1998. The consistent divergence between OD and UD traffic indicates that some passengers were using Indonesia as an intermediate stop on the way to their final destination.

Visitor arrival growth rate forecasts by the Tourism Forecasting Council (1999) predict a three per cent drop in arrivals from Indonesia in 1999 after a 42 per cent fall in 1998 and three per cent growth in 1997. The Tourism Forecasting Council predicts that visitor arrivals from Indonesia will resume growth (13 per cent) in 2000, but remain well below 1997 levels for some time. Average annual growth in visitor arrivals from Indonesia over 1998–2008 is forecast to be 10.7 per cent (Tourism Forecasting Council, 1999).

In line with these forecasts, historical passenger data and the general economic outlook for Indonesia, it is assumed that Indonesian visitors to Australia will fall by three per cent in 1999 as predicted by the Tourism Forecasting Council and recover with 13 per cent growth in 2000. It is also assumed that the number of Australians visiting Indonesia will continue to grow at the average annual rate of ten per cent in both 1999 and 2000.

FIGURE 26 AUSTRALIA-INDONESIA AIR PASSENGER MARKET—1991-1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional services, AVSTATS, (1999).

These assumptions lead to a scenario of increasing demand for seats in the market in 1999 (seven per cent) and 2000 (11 per cent growth). This recovery of growth continues to be driven by the Australians travelling to Indonesia (predominantly to Bali) with total demand for seats increasing beyond 1997 levels in 2000.

However, airlines are not expected to respond to this increasing demand for seats in the short term. While Australian-based airlines may increase flights in 1999 (in response to increasing demand and reasonably good load factors) the economic difficulties (and low load factors) faced by the Indonesian airlines are expected to prevent any change in services in 1999.<sup>31</sup> This expectation is confirmed by 1999 airline schedules, which show little change in flights in 1999 compared to the end of 1998. There is a 15 per cent decline in flights in 1999 over total 1998 levels, as the major reduction in supply did not occur until late 1998.

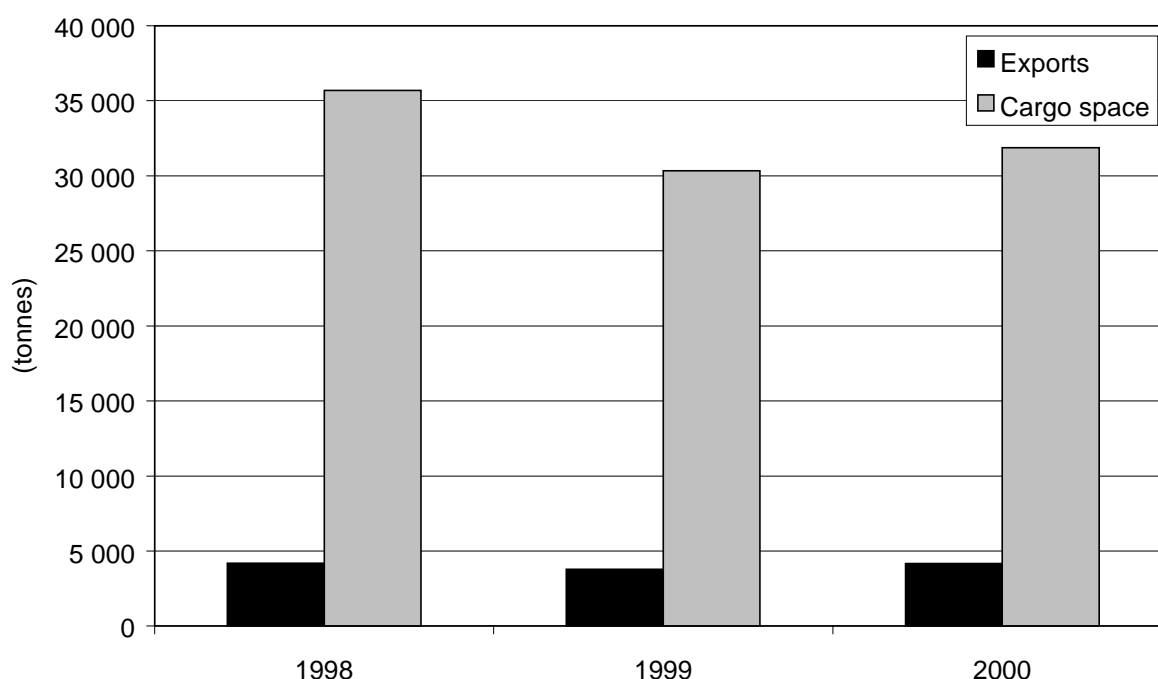
By 2000, airlines are expected to be in a position to respond to the recovery in demand forecast by the Tourism Forecasting Council by increasing the supply of flights by five per cent. Assuming airlines maintain a relatively constant fleet mix, this will translate to a 15 per cent decline in cargo space in 1999 and a five per cent rise in 2000. The cargo scenario, therefore, is that capacity falls to 30 300 tonnes in 1999, rises to 31 900 tonnes in 2000, but remains below 1998 levels.

<sup>31</sup> 1998 average load factors for Indonesian airlines—Garuda and Merpati—were around 64 per cent and less than 50 per cent respectively. In contrast, Qantas achieved approximately 74 per cent and Ansett over 80 per cent average load factors for 1998.

*Implications for air freight supply and demand*

Air freight supply and demand scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 27 illustrates the scenario outlook. After allowing for the assumptions made, Australian exports to Indonesia are very unlikely to face any air freight capacity constraints in the short- to medium-term with utilisation rates remaining below 15 per cent. The figure clearly shows that despite falls in cargo capacity in 1999 there remains ample space in this market.

**FIGURE 27 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO INDONESIA—1999–2000**



Source BTE analysis.

**Republic of Korea**

***Exports (by air)—1996–1998***

The Republic of Korea (South Korea) is one of the smallest of the ‘medium’ markets for Australian air freight exports. Australian exports to South Korea fell dramatically in 1998 (by 67 per cent) from 7220 tonnes in 1997 to 2387 tonnes in 1998.<sup>32</sup> This was a result of the Asian crisis, in which South Korea was one of the worst affected

<sup>32</sup> 2387 tonnes of air freight were flown from Australia and ‘unloaded’ in South Korea in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, freight forwarders/exporters recorded 2439 tonnes of freight as ‘destined’ for South Korea. In other words, 52 tonnes went to South Korea via other countries (on indirect flight routings).

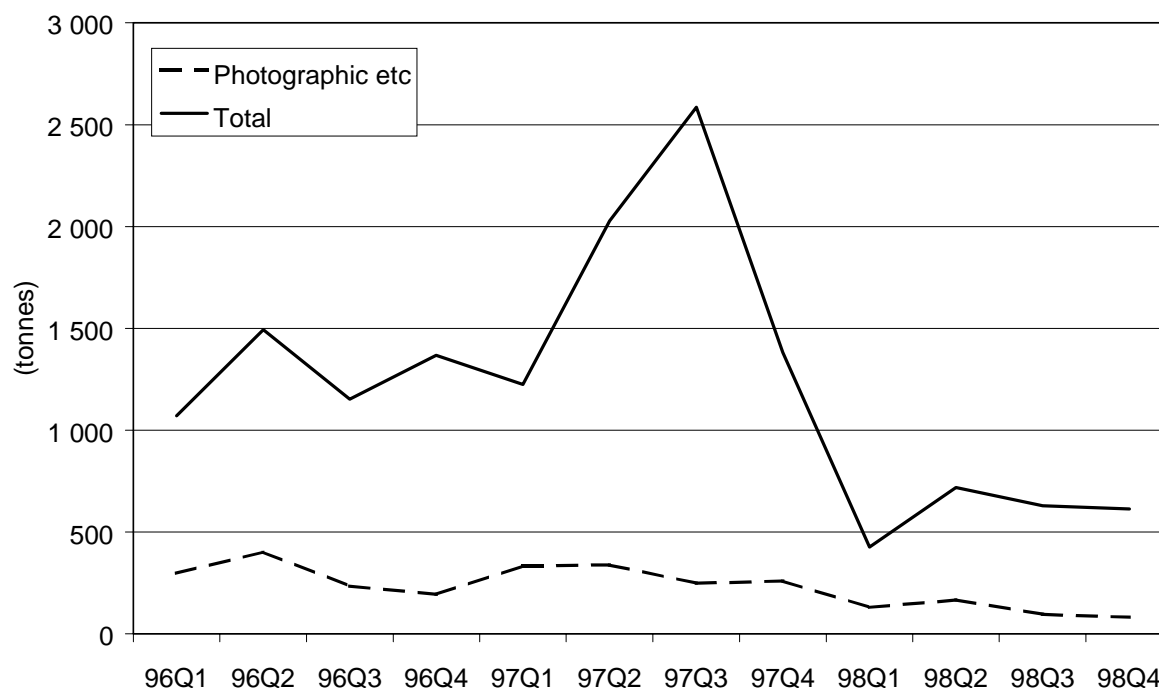


countries. Prior to this crisis the export market to South Korea had been growing strongly (by 42 per cent in 1996). This dramatic fall in exports in 1998 must be tempered somewhat by recognising that the 1997 total included an unusually large spike in one commodity group (road vehicles) which may have distorted the results.

### *Major export groups*

During 1996–1998, the main commodity group exported by air to South Korea was *photographic equipment*. In 1996, this group represented 22 per cent (or 1128 tonnes) of Australian exports to South Korea. Demand for *photographic equipment* fell by 60 per cent during 1998 to 475 tonnes after five per cent growth in 1997. Despite this dramatic decline, *photographic equipment* maintained its dominant position with a 20 per cent share of the market in 1998. Figure 28 illustrates a three-year quarterly history of this major export group.

**FIGURE 28 AIR FREIGHT EXPORTS TO SOUTH KOREA—1996–1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### *Food Exports*

The composition of the South Korean market is substantially different to other Asian countries in that food exports accounted for only around ten per cent of total exports in 1998. Over the three-year period, only two of the top 15 commodity groups were food. However, food items have been increasing, as they represented only four per cent of the market in 1996. Contrary to what may have been expected, growth in food items was stagnant in 1997 but unaffected by the Asian crisis, enjoying 23 per cent growth in 1998.

The major food commodity groups exported to South Korea were *miscellaneous edible* and *meat*. *Meat* exports declined over 1996-98, falling 27 per cent in 1997 and one per cent in 1998. After the initial fall in 1997, it appears that the Asian crisis had little further impact on *meat* exports in 1998. The *miscellaneous edible* commodity group has been relatively unaffected by the Asian crisis, recording strong growth over the period (48 per cent in 1997 and 46 per cent in 1998).

Table 20 outlines in more detail changes in the level of exports to South Korea between 1996-98.

**TABLE 20 MAJOR COMMODITIES EXPORTED BY AIR TO SOUTH KOREA—1996—1998**

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Other	366.9	582.9	426.6	501.7	487.2	483.6	379.1	350.1	116.2	105.7	225.7	215.9
Miscellaneous edible	18.5	15.7	16.9	14.9	33.3	28.1	21.0	15.1	8.9	12.5	36.8	84.5
Photographic etc	296.7	402.5	234.1	194.7	333.0	338.8	248.3	259.4	129.7	167.1	96.4	81.6
Office machines/ADP	77.2	129.5	99.7	33.8	26.4	55.3	58.7	63.2	27.3	30.4	34.7	42.6
Other commodities	21.4	29.1	38.5	39.0	26.5	48.2	37.0	55.0	20.4	68.0	45.3	40.8
Meat	22.5	29.2	24.5	46.4	21.3	21.0	25.1	24.1	5.2	9.7	36.7	39.0
Misc manufactured	37.3	53.7	52.2	101.4	95.3	55.9	59.9	49.5	23.8	61.0	35.4	23.1
Gold, non-monetary	33.9	46.2	44.9	50.8	25.4	36.1	36.3	24.5	10.0	27.8	26.0	19.6
General industrial	31.7	33.5	80.8	122.8	50.2	51.5	60.2	39.4	14.9	24.0	20.4	16.4
Medicinal	6.5	17.4	13.8	24.6	17.0	26.8	17.9	25.7	18.2	18.1	9.1	13.3
Electrical	15.6	18.7	39.5	19.4	37.1	32.7	17.1	17.0	31.1	20.0	9.2	12.3
Machinery specialised	84.8	11.9	27.7	15.1	28.8	24.5	15.5	26.7	8.6	22.6	32.6	10.0
Road vehicles	45.7	93.8	17.6	178.6	30.7	795.3	1116.1	56.7	5.3	40.5	11.5	8.2
Power machinery etc	9.0	28.9	27.3	24.8	10.8	29.8	470.1	362.7	4.8	66.4	9.0	2.3
Other transport equip	0.3	1.3	1.3	0.3	2.0	0.1	22.4	10.4	0.2	17.0	0.2	2.1
Feeding stuff for animals	2.6	0.0	7.4	0.0	0.0	0.0	0.0	2.9	1.4	28.0	0.0	1.7
Total	1 071	1 494	1 153	1 368	1 225	2 028	2 585	1 382	426	719	629	613

*Note* Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### *Airlines, flights and cargo capacity*

During 1998, four airlines—Ansett International, Asiana Airlines, Korean Air and Qantas—served the South Korean market (all offering direct services). However, both Ansett and Qantas withdrew from the market during the second quarter in response to reduced demand for seats. Instead, both airlines aligned themselves with South Korean airlines through code sharing agreements in order to maintain some presence in the market.

In total, there were 648 flights between Australia and South Korea in 1998, of which 598 flights (or 92 per cent) were passenger services, while the remaining 50 flights were dedicated freighters. The freighters made available approximately 3900 tonnes

(or 37 per cent) of the 10 500 tonnes of total year cargo capacity, despite offering only around eight per cent of the total number of flights.<sup>33</sup>

During 1998, the number of flights offered to the market fell by 62 per cent from the first to the last quarter. The bulk of this decline occurred in the second quarter, when flights dropped from 299 to 117 as both Ansett and Qantas withdrew services, and the remaining airlines changed their aircraft fleet mix in response to falling load factors. The massive decline in flights was also reflected in seats and cargo capacity declining by 69 and 53 per cent respectively during the course of 1998. The fall in cargo capacity was less than that which occurred in flights or seats due to only a small reduction in dedicated freight services and an increase in the use of Boeing 777 aircraft, which have a relatively large cargo capacity.

Korean Air was the only airline flying dedicated freighters during 1998. It changed the aircraft fleet used during this time and slightly reduced services in the last quarter of 1998, but had only a small impact on total freight capacity for the year.

Table 21 traces the changes in the number of flights, seats and cargo capacity by aircraft type for 1998.

**TABLE 21 ESTIMATES OF CARGO SPACE AVAILABLE TO SOUTH KOREA—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	B747	169	0	0	0	169
	B747F	0	13	13	3	29
	B767	117	52	52	52	273
	B777	0	52	52	52	156
	MD11F	13	0	0	8	21
	Total	299	117	117	115	648
Seats	Passenger	91 000	28 000	28 000	28 000	175 000
Cargo capacity (t)	Passenger	3 300	1 100	1 100	1 100	6 600
	Freighter	1 000	1 000	1 000	900	3 900
	Total	4 300	2 100	2 100	2 000	10 500

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

*Source* BTE estimates.

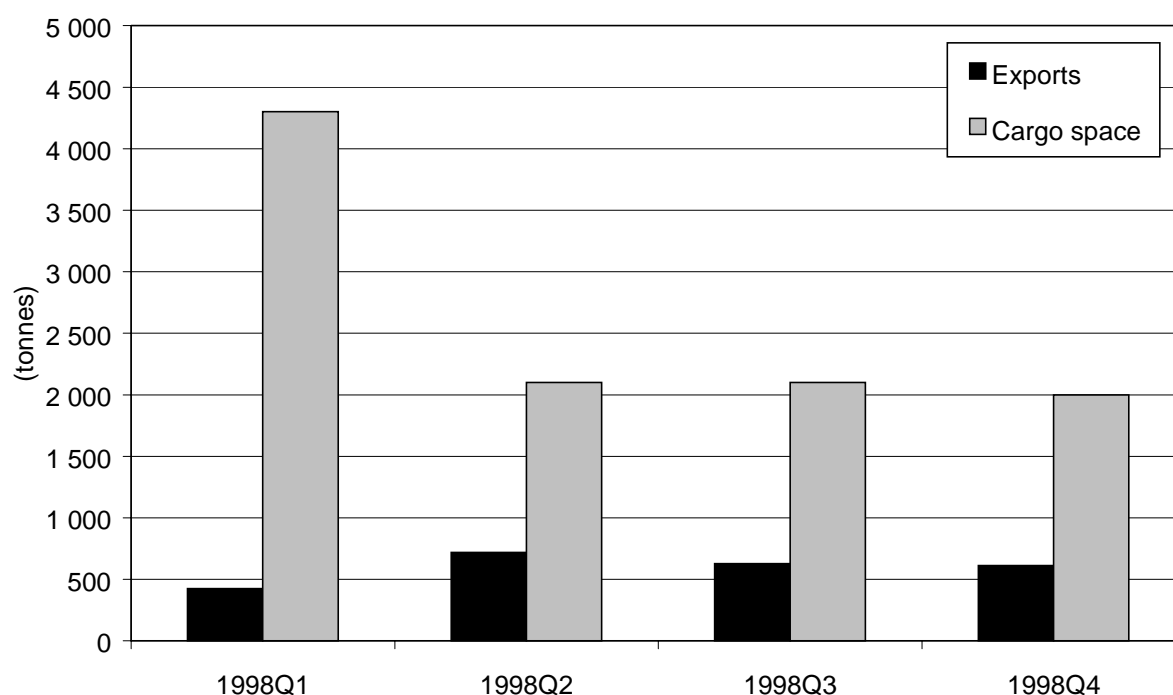
### *Alignment of supply and demand—1998*

A review of the cargo space supply and demand to South Korea provides a first order indication of whether any pressures exist on international air freight services in this market. This should identify possible problem areas within the air freight logistics chain to South Korea.

<sup>33</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

Figure 29 illustrates the quarterly cargo space supply and demand on flights to South Korea during 1998. It shows that as capacity was taken from the market, utilisation rates increased, but still remained below 40 per cent. Hence, exporters who used these air services in 1998 appear to have faced no constraints on the amount of cargo space required.

**FIGURE 29 AIR CARGO SPACE SUPPLY AND DEMAND TO SOUTH KOREA—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

A definite view on the future air freight capacity supply and demand to South Korea is difficult to establish because of the multitude of variables affecting the air freight sector and the magnitude of the changes which occurred in the market in 1998. However, by exploring a scenario for air freight capacity it is possible to establish how the market might develop under certain assumptions. The outcome of this scenario is used as indicative or illustrative of the future conditions in the market. The following sections develop such a scenario.

#### ***South Korea's economy and prospects for food exports***

The outlook for South Korea (population 45 million, GDP per head \$US 6 600)<sup>34</sup> is for the economy to rebound reasonably well in 1999 and 2000 after the severe economic contraction brought on by the Asian crisis in 1998. According to the International Monetary Fund (1999), the outlook for South Korea in terms of real GDP growth is -

<sup>34</sup> Supermarket to Asia (1999f), J.P. Morgan (1999)

5.5 per cent in 1998, 2.0 per cent in 1999 and 4.6 per cent in 2000. The South Korean economy was one of the worst affected by the Asian crisis. This was a result of corporate business failures brought on by large short-term debt commitments that were unable to be serviced, while international investors lacked confidence in the region. This led to large falls in domestic investment and domestic production, causing rising unemployment and falling aggregate demand. Consequently, the South Korean economy entered into a recessionary period.

In the short term, food imports to South Korea are expected to decline as the economy undergoes major adjustments and consumer demand and business confidence remain depressed. Supermarket to Asia (1998f) predicts this will constrain growth in the imported food market and it is expected to remain subdued at least over the short term. Over the medium- to longer-term, the Asian crisis is expected to result in greater opportunities for Australian exports (particularly food) as South Korea removes some of its trade barriers as required in the IMF rescue package. Other factors expected to impact positively on Australian food exports to South Korea include: strong economic growth prospects, industrialisation resulting in a change in the structure of the economy, falling domestic food production and a shift toward a more westernised diet.

#### *Demand for air freight capacity*

As stated above, it is expected that real GDP for the South Korean economy will recover in 1999 and record reasonably strong growth in 2000, with a return of investor confidence and financial and trade reforms leading the recovery. As a result, Australian exports are expected to recover in 1999, with further growth in 2000.

Taking into account South Korea's economic performance, the food export opportunities identified by Supermarket to Asia, the last three years of Australian air freight exports and making some assumptions about the market, the following scenario has been developed for exports to South Korea during 1999 and 2000. After remaining stagnant in 1997, food exports to South Korea managed to increase by 23 per cent in 1998 in spite of the Asian crisis. As a result, it is assumed that this strong growth will continue over the next two years (25 per cent in 1999 and 30 per cent in 2000) as the Government removes some of the regulatory impediments to food imports and economic growth strengthens enabling consumer purchasing power to increase.

'Other' commodity groups made up 90 per cent of total air exports to South Korea. As a result, despite the strength of the food sector, it is 'other' exports that will determine the performance of total Australian exports over the next few years. The Asian crisis had a much more severe effect on 'other' exports than on food, with a 69 per cent drop in 1998. Unlike food, 'other' exports have showed a strong positive correlation with GDP over the last few years. It is assumed that this relationship will continue over the next two years, but not to the same extent. It is also assumed that the dominance of 'other' exports will continue. This leads to the assumption that 'other' commodity groups will increase by 15 per cent in 1999 and 25 per cent in 2000. The end result of this analysis is that total air exports will remain well below 1997 levels for the foreseeable future.

The results of these assumptions on total demand for air freight space are shown in table 22.

**TABLE 22 SCENARIO OUTLOOK FOR AIR FREIGHT TO SOUTH KOREA**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	7.1	5.5	-5.5	2.0	4.6
Food (annual % change)		0	23	25	30
Other (annual % change)		44	-69	15	25
Food (tonnes)	189	189	233	300	400
Other (tonnes)	4 897	7 031	2 154	2 500	3 100
Total (tonnes)	5 086	7 220	2 387	2 800	3 500

Sources International Monetary Fund (1999), BTE estimates.

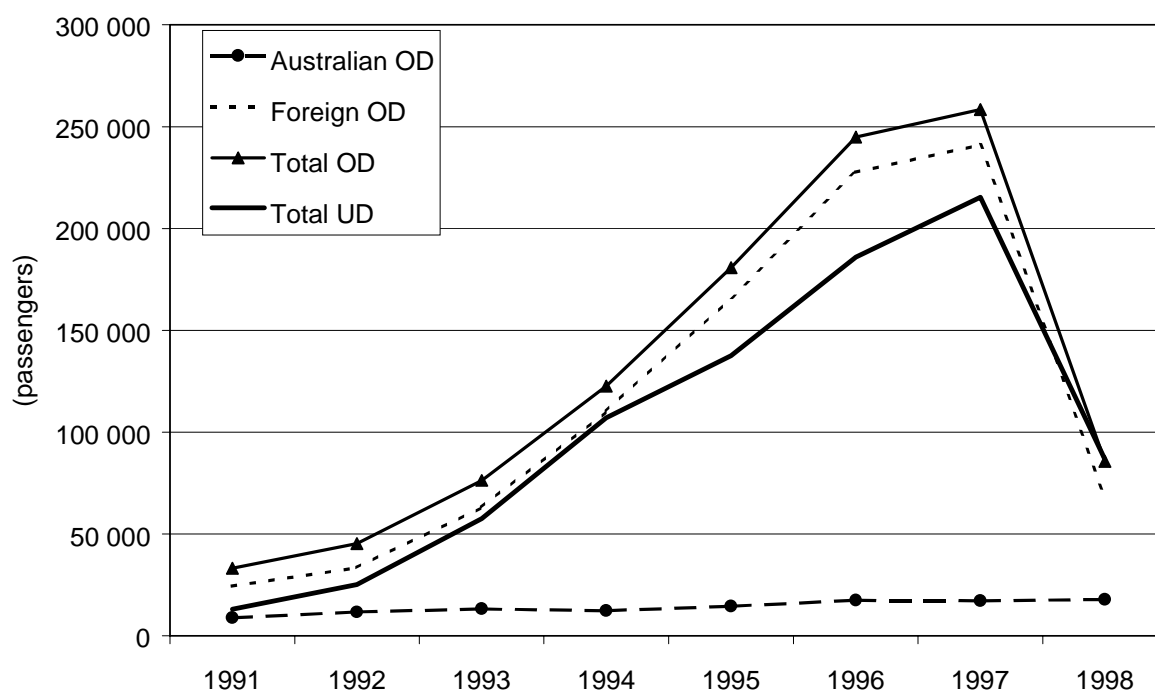
### *The passenger market and supply of flights*

Passenger aircraft dominated the Australia–South Korea aviation market in 1998 with approximately 92 per cent of flights, delivering 63 per cent of the air freight capacity. The drastic reduction in flights during 1998 makes it difficult to form a view on the likely market profile for 1999 and 2000. However, it is expected that passenger aircraft will continue to dominate the market, and it is therefore necessary to examine the passenger sector in order to produce a reasonable freight scenario. The supply of passenger flights is determined by passenger demand and government regulations. Currently there is adequate capacity in the bilateral air service agreement for airlines to commence additional services if warranted by demand and if dedicated freight services are permitted.

An eight-year time series of origin–destination (OD) traffic between Australia and South Korea illustrates the evolution of the passenger market in recent times. Air traffic between Australia and South Korea had been growing relatively strongly until the Asian crisis hit. Between 1991 and 1997, South Korean visitors to Australia grew at an average annual rate of 47 per cent, while Australians visiting South Korea grew at a rate of 11 per cent between 1991 and 1998. However in 1998, both OD and UD traffic plummeted (by 67 and 60 per cent respectively) as the Asian crisis reduced the demand for travel to Australia. The Australian OD market managed to sustain small growth (four per cent in 1998) while the foreign OD market tumbled by 72 per cent. Australian passenger numbers represent only a small proportion of the market, and despite remaining relatively steady over the period, had little effect on total demand for seats.

Figure 30 shows that OD passengers were greater than UD passengers until 1998. This reflects the fact that for most of the period, slightly more passengers used intermediate points in Asia to travel between Australia and South Korea rather than flying direct. In 1998, the market experienced a minor change, with UD passengers marginally outnumbering OD passengers. However, the difference between the two sets of traffic data is too small to draw any firm inferences.

FIGURE 30 AIR PASSENGERS MARKET—AUSTRALIA—SOUTH KOREA—1991–1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

The Australian OD market is expected to continue to increase during 1999 and 2000 in line with stronger economic growth in Australia. Australian OD passengers have grown at an average annual growth rate of 11 per cent since 1991. The Asian crisis reduced this growth to four per cent in 1998. In line with IMF growth forecasts and these historical figures, it is assumed that Australian OD passengers will continue to grow annually by approximately 11 per cent during 1999 and 2000.

The Tourism Forecasting Council (1999) predict that visitor arrivals from South Korea (foreign OD) will recover from its 1998 dive by recording growth of 19 per cent in 1999, followed by a further increase of 24 per cent in 2000. To determine the size of the total OD market, the Tourism Forecasting Council predictions have been combined with assumptions regarding Australian OD traffic, to reach an overall scenario of the demand for seat capacity over the next few years. As a result, it is assumed that the total market demand will increase by 17 per cent in the 1999 and 21 per cent in 2000.

However, airlines are not expected to respond to this increasing demand for seats in the short term. It is assumed that Australian airlines will maintain only code share arrangements and that one additional passenger flight per week will be added in both 1999 and 2000. It is also assumed that Korean Air will maintain two dedicated freight flights per week over this period. These expectations are confirmed by 1999 airline schedules, which show little change in flights in 1999 compared to the end of 1998, with only Korean Air adding one flight a week. There was a 12 per cent decline

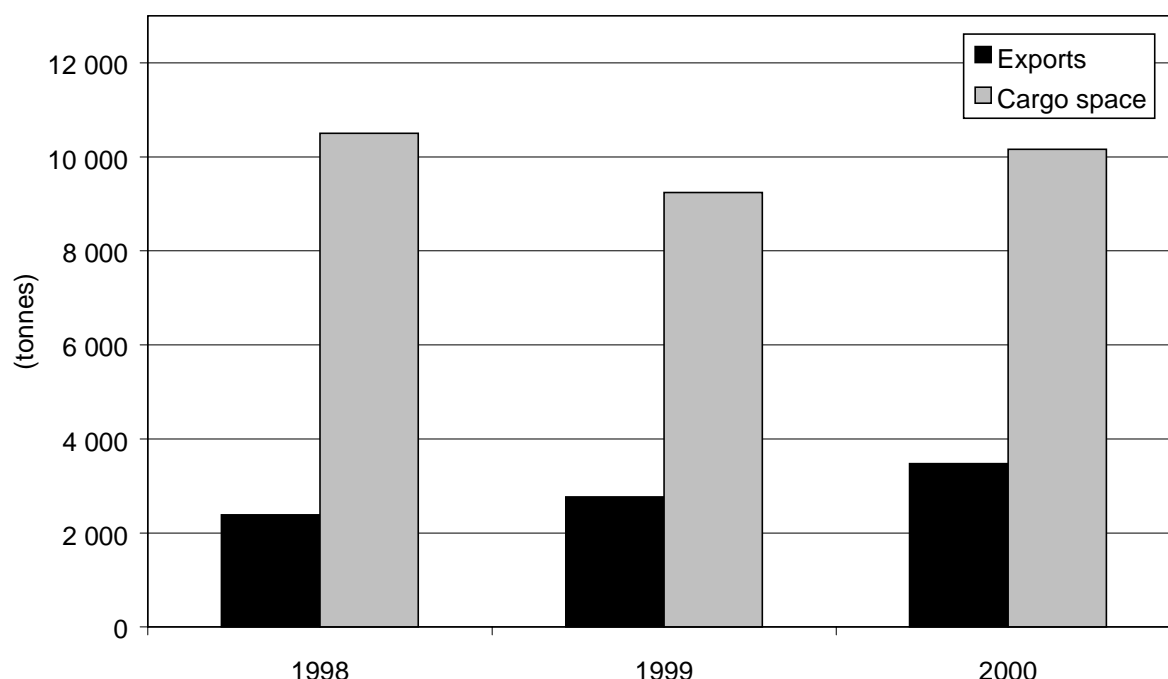
in flights in 1999 over total 1998 levels, as the major reduction in supply did not occur until the second quarter of 1998.

By 2000, Korean airlines is expected to be in a position to respond to the recovery in demand forecast by the Tourism Forecasting Council by increasing supply of flights by ten per cent. Assuming airlines maintain a relatively constant fleet mix, this will translate to a 12 per cent decline in cargo space in 1999 and a ten per cent rise in 2000. The cargo scenario, therefore, is that capacity falls to 9200 tonnes in 1999 and rises to 10 200 tonnes in 2000 but remains below 1998 levels.

***Implications for the supply of seats, flights and cargo capacity***

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 31 illustrates the scenario outlook. After allowing for the assumptions made, Australian exports to South Korea are very unlikely to face any air freight capacity constraints in the short- to medium-term, with utilisation rates remaining below 35 per cent. Figure 31 shows that despite falls in cargo capacity in 1999, there remains ample cargo space in this market to match any sharp changes in demand over the short- to medium-term.

**FIGURE 31 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO SOUTH KOREA—1999-2000**



Source BTE analysis.



## Malaysia

### *Exports (by air)—1996–1998*

Malaysia is the biggest of the ‘medium’ markets for air freight exports—receiving over 12 200 tonnes of commodities from Australia in 1998.<sup>35</sup> However, this is a substantial decline from the strongly growing market which imported 17 500 tonnes of Australian air freight in 1997—a decline which underscores the impact of the financial crisis on Malaysia’s economy.

#### *Major export groups*

During 1996–1998, the main commodity group exported by air to Malaysia has been *fresh vegetables*. During each of these years, *fresh vegetables* made up slightly more than a third of the country’s air freight imports from Australia. The demand for *fresh vegetables*, while remaining a constant proportion of the total, declined in 1998 to 4462 tonnes, a 30 per cent fall from 1997 (6353 tonnes).

The next largest air freight export over the three years was *fresh fruit*, comprising just under 20 per cent of the three-year total (1996–1998). However, this commodity group has displayed a much greater variation over the period, and greater seasonality, than *fresh vegetables*. In 1996, *fresh fruit* made up 17 per cent of air freight; in 1997, it made up 22 per cent; and in 1998, it again dropped to 17 per cent. The volume exported in 1998 (2049 tonnes) was 46 per cent lower than the 3769 tonnes exported in 1997. Figure 32 illustrates a three-year quarterly history of these major export groups.

#### *Food exports*

Food items made up five of the top 15 air export commodity groups over 1996–1998; and in 1998, these five groups constituted 61 per cent of the total air freight to Malaysia.

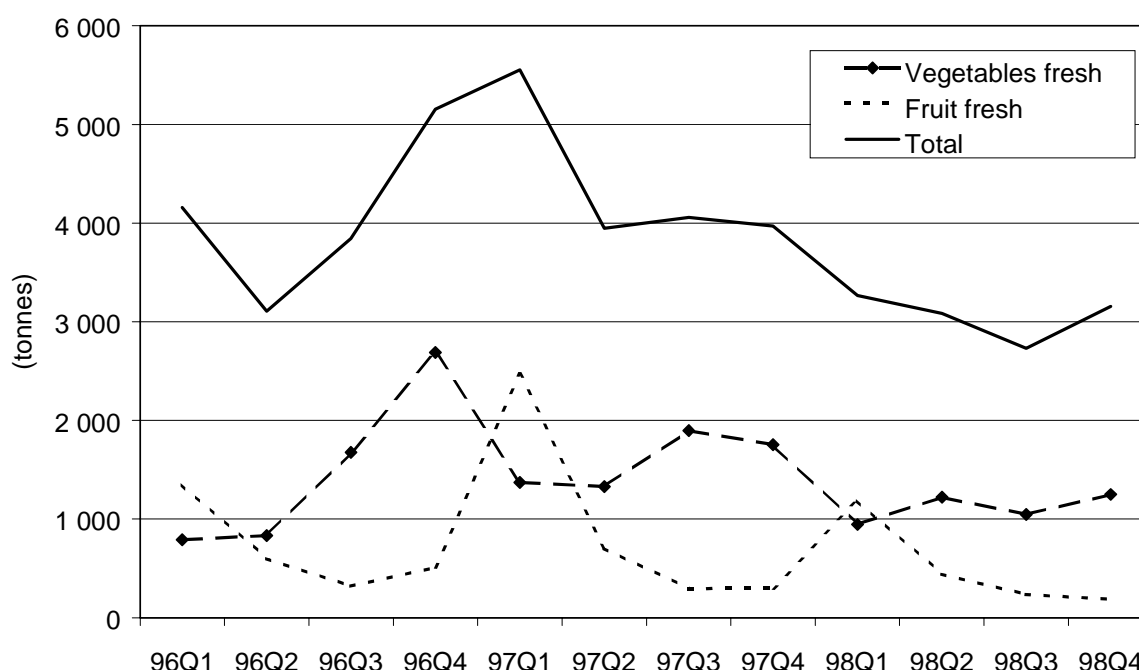
In addition to the *fresh vegetable* and *fresh fruit* groups mentioned already, Australia exported *meat*, *dairy products* and *preserved fruit* to Malaysia. Air exports of *preserved fruit* declined in 1998, whereas the *meat* and *dairy product* categories continued to exhibit strong growth, despite the general decline in export demand.

Table 23 provides more detail of the quantities of various commodity groups exported to Malaysia over the period 1996 to 1998.

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<sup>35</sup> 12 235 tonnes of air freight were flown from Australia and ‘unloaded’ in Malaysia in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, of this 12 235 tonnes, 11 837 tonnes were recorded by freight forwarders/exporters as ‘destined’ for Malaysia. In other words, 398 tonnes (or around three per cent) was for transshipment to other markets.

FIGURE 32 AIR FREIGHT EXPORTS TO MALAYSIA—1996—1998



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

TABLE 23 MAJOR COMMODITIES EXPORTED BY AIR TO MALAYSIA—1996—1998

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Vegetables fresh	790	833	1 677	2 689	1 372	1 330	1 898	1 753	944	1 222	1 047	1 249
Other commodities	494	65	63	84	116	22	241	300	234	268	312	293
Meat	104	98	140	177	170	146	145	143	118	121	143	251
Fruit fresh	1 347	599	318	512	2 473	703	294	299	1 185	441	234	189
Dairy products	39	3	33	43	38	46	49	59	32	47	52	159
Medicinal	117	156	144	70	88	98	134	128	88	111	95	85
Misc manufactured	81	98	95	98	80	92	113	99	57	90	88	81
General industrial	60	73	100	109	78	94	112	150	52	80	60	45
Office machines/ADP	72	50	34	34	25	42	41	39	28	37	44	40
Electrical	39	63	105	47	47	63	74	51	36	38	46	32
Textiles	28	23	39	52	19	28	25	41	28	38	44	28
Fruit preserved	32	25	34	44	43	26	39	41	16	42	10	20
Chemical	8	8	18	14	19	32	11	19	16	50	26	18
Live animals	64	97	190	130	134	191	181	76	34	66	84	13
Cork & wood	4	1	8	9	10	9	12	13	6	54	10	13
Other	882	917	844	1 044	844	1 026	691	762	393	379	438	640
<b>Total</b>	<b>4 160</b>	<b>3 108</b>	<b>3 843</b>	<b>5 156</b>	<b>5 555</b>	<b>3 948</b>	<b>4 059</b>	<b>3 971</b>	<b>3 264</b>	<b>3 084</b>	<b>2 731</b>	<b>3 156</b>

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

**Air cargo capacity—1998***Airlines, flights and cargo capacity*

During 1998, eight airlines—Ansett International, British Airways, KLM Royal Dutch Airlines, Lauda Air, Malaysia Airlines, Martinair, Middle East Airlines, and Qantas—offered flights directly or indirectly connecting Australia and Malaysia.

In total, 1994 flights were available, of which 1903 used passenger aircraft and the remaining 91 used dedicated freighters. The freighters made available around 6500 tonnes (or 17 per cent) of the 38 000 tonnes of cargo capacity available, despite offering less than five per cent of the flights.

Over the four quarters of 1998, there was a moderate reduction in the total number of flights offered in this market—572 to 461. However, it is noteworthy that accompanying this reduction there was only a small decline in the number of passenger seats available (151 000 to 144 000) and a small increase in the amount of cargo capacity (9100 tonnes to 9600 tonnes).<sup>36</sup> This preservation of total seat numbers and the increase in cargo capacity resulted from a significant change in the composition of the aircraft fleet serving the market. The Boeing 767s used in the early part of the year were all but phased out in favour of larger Boeing 747s and 777s. In addition to the larger cargo holds of these bigger aircraft, the increase over the year in total cargo capacity was partly due to the entry of a second weekly freighter service connecting Australia with Malaysia. Table 24 summarises the quarterly breakdown of flights and cargo capacity by aircraft type (passenger or freighter).

**TABLE 24 ESTIMATES OF CARGO SPACE AVAILABLE TO MALAYSIA—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A310	13	0	0	0	13
	A330	59	26	10	0	95
	B747	130	157	169	192	648
	B767	195	102	39	9	345
	B777	162	195	211	234	802
	B747F	13	26	26	26	91
	Total	572	506	455	461	1 994
Seats	Passenger	159 000	144 000	136 000	144 000	575 000
Cargo capacity (t)	Passenger	7 700	8 000	7 900	7 900	31 500
	Freighter	1 400	1 700	1 700	1 700	6 500
	Total	9 100	9 700	9 600	9 600	38 000

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

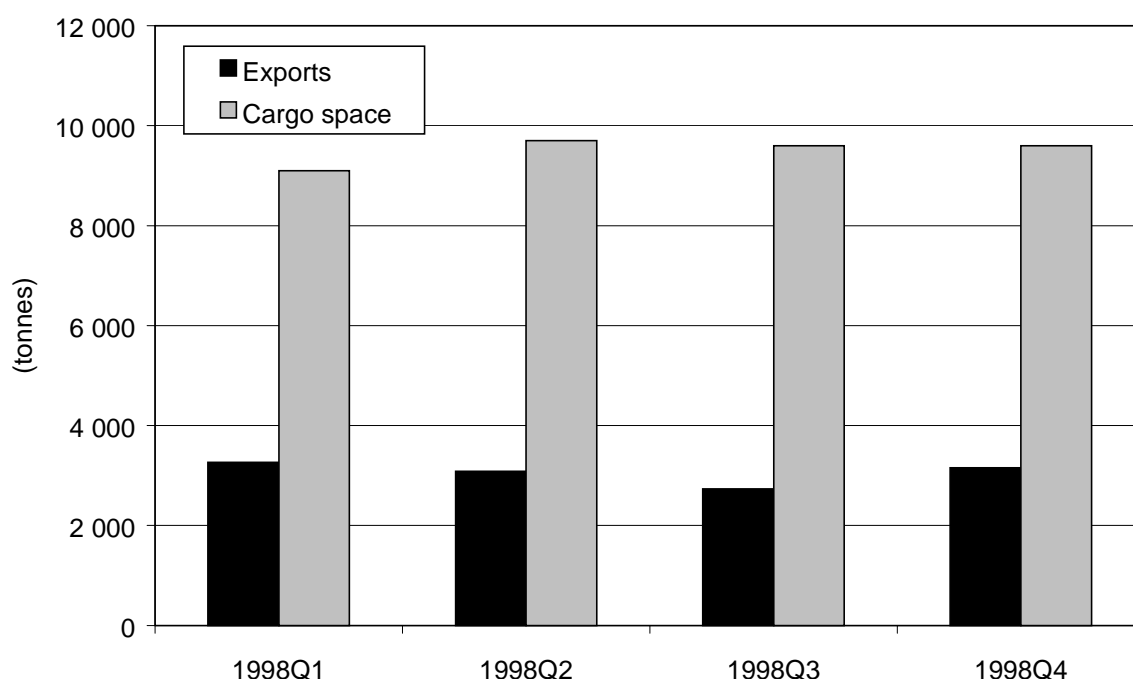
<sup>36</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

*Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to Malaysia) and the amount of export cargo space offered by the airlines provides a first-order assessment of the pressure, or the extent of demand, on the international air freight link of the logistics chain to Malaysia.

Figure 33 illustrates the quarterly freight space supply and demand on flights to Malaysia during 1998. As figure 33 shows that around one-third of available space was utilised, it seems reasonable to conclude that exports by air faced no constraints on the amount of cargo space required in 1998.

**FIGURE 33 AIR CARGO SPACE SUPPLY AND DEMAND TO MALAYSIA—1998**



Source BTE analysis of ABS International Cargo Statistics (unpublished).

***Outlook for the air freight sector***

It is not possible to form a definite view on the future air freight capacity supply and demand to Malaysia, given the multitude of contributing variables. However, it is possible to explore a reasonable scenario of what the demand for air freight capacity and supply of this capacity might look like under certain assumptions about the way the market develops in the near future. The outcome of this scenario can then be interpreted as indicative or illustrative of the future under certain conditions. The following sections develop such a scenario.

*Malaysia's economy and prospects for food exports*

The outlook for the Malaysian economy (population 21 million, GDP per capita \$US 3 000)<sup>37</sup> is for a slowdown in the short term as the government responds to the regional financial crisis with a fiscal austerity program, followed by a recovery into 2000 and beyond. The International Monetary Fund (1999) forecasts a recovery and return to positive growth rates for the Malaysian economy in 1999 and into 2000 after the economy suffered -6.8 per cent real GDP in 1998. However, economic growth is predicted to remain subdued at no more than two per cent for the next two years.

In the short term, diminished business confidence and a reduction in consumer purchasing power, along with a weak currency and poor economic growth prospects, are dampening general consumer demand in Malaysia and have led to a constriction of the imported food market (Supermarket to Asia, 1998g, pp. 5-8). However, in the medium term, the outlook is brighter. Malaysia is experiencing a gradual liberalisation in market access, declining domestic food production, an increased reliance on food imports and an increasing demand for convenient, healthy western-style foods. Supermarket to Asia (1998g) believes Australia is well placed to take advantage of these growth prospects in the imported food market.

*Demand for air freight capacity*

Taking into account forecast recovery rates for the Malaysian economy, the food export opportunities identified by Supermarket to Asia<sup>38</sup>, the last three years of Australian air freight export volumes to Malaysia, and applying a few judgements, the following scenario has been developed for export quantities to Malaysia in 1999 and 2000:

- In 1999, as the economy recovers from a sharp dip into recession, and bolstered by a faster than otherwise expected regional recovery, Malaysian consumer confidence returns bringing with it a return to positive growth rates generally in Australian food imports. Demand for 'other' Australian exports continues to fall, albeit at a much lower rate than in 1998.
- In 2000 as the economy recovers further, Australian food exports again rise, and the fall in 'other' commodity groups ceases.

Food items are considered separately because more information was available on the export outlook provided by Supermarket to Asia. Also, food items make up a large part of the air exports market to Malaysia (63 per cent in 1998 of those explicitly identified in the top 15 commodity groups—a proportion that has held relatively constant for the last three years). They therefore clearly form an important set of commodities to account for in coming to any view on the future demand for air freight capacity.

Table 25 summarises the historical and projected scenario data for Malaysia.

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<sup>37</sup> Supermarket to Asia (1999g), J.P. Morgan (1999).

<sup>38</sup> Supermarket to Asia (1998g, p. 17) forecast the consumption of food products will return to previous growth rates as the economy recovers (into 2000).

**TABLE 25 SCENARIO OUTLOOK FOR AIR FREIGHT TO MALAYSIA**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	8.8	7.7	-6.8	1.0	2.0
Food (annual % change)		16	-32	4	7
Other (annual % change)		-4	-27	-5	0
Food (tonnes)	9 537	11 067	7 522	7 800	8 400
Other (tonnes)	6 731	6 470	4 718	4 500	4 500
Total (tonnes)	16 268	17 537	12 240	12 300	12 900

Sources: International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

Australia–Malaysia is an aviation market served mainly by passenger aircraft. In 1998, 95 per cent (1903 of the 1994 flights) were passenger services, delivering 83 per cent of the air freight capacity. It is reasonable to assume that this will remain the profile of the market into the short- to medium-term future, and so to form a view on the future supply of freight capacity it is necessary to form a view on the future supply of passenger services.

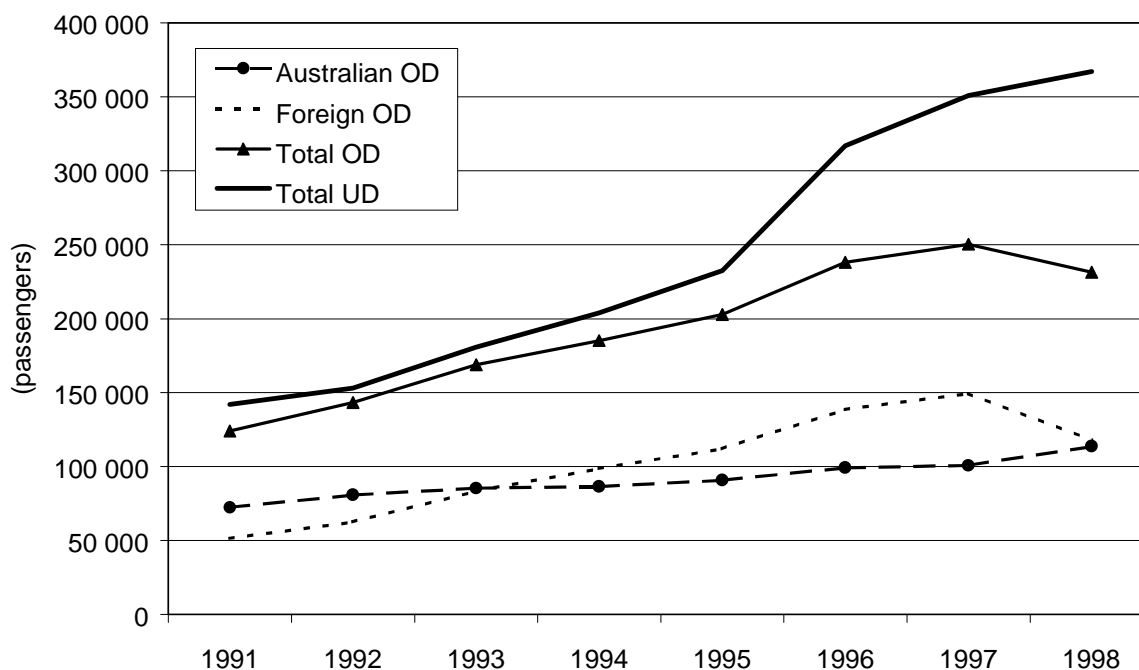
An eight-year time series of origin–destination (OD) traffic between Australia and Malaysia illustrates the evolution of the passenger market in recent times. Between 1991 and 1997, Malaysian visitors to Australia grew at an average annual rate of 19 per cent, while Australians visiting Malaysia grew at a rate of six per cent. This caused a crossover in 1994, when the number of Malaysian visitors exceeded the number of Australians in the market. The divergence continued until 1998, when the impact of the economic crisis in Malaysia suppressed travel by Malaysians to close to 1995 levels.

Also important is that from the mid-90s, Malaysia began to take on aspects of a regional hub at which airlines transited passengers to/from other destinations. The divergence in uplift–discharge (UD) passenger numbers from OD in figure 34 reveals the emergence of the hub. In 1998, while Malaysians reduced their travel to Australia, the fact that Australians continued to visit Malaysia and that airlines continued to hub in Malaysia meant that demand for the total number of seats from Australia to Malaysia did not decrease—in fact it went up by five per cent.

In developing the scenario for 1999 and 2000 it is assumed that:

- The growth in the number of Australians visiting Malaysia will continue to increase at historical levels (6.6 per cent per annum).
- The growth in Malaysians visiting Australia will recover at rates forecast by the Tourism Forecasting Council (1999), being approximately two per cent in 1999 and 15 per cent in 2000.
- The divergence between OD and UD demand will continue, albeit at slightly reduced rates over the past several years (an additional 20 000 UD passengers per year over the OD number).

FIGURE 34 AUSTRALIA-MALAYSIA AIR PASSENGER MARKET—1991-1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

These assumptions generate a net number of UD passengers in the Australia-Malaysia market of 499 000 in 1999 (a year-on-year increase of 32 000) and 445 000 in 2000 (a year-on-year increase of 46 000).

A further assumption made is that the average seat utilisation achieved in the last three quarters of 1998 in this market (about 68 per cent) will be roughly maintained by the airlines in the near future. The result of this line of reasoning is that the airlines are expected to increase seats to Malaysia by nine per cent in 1999 and by a further 12 per cent in 2000.

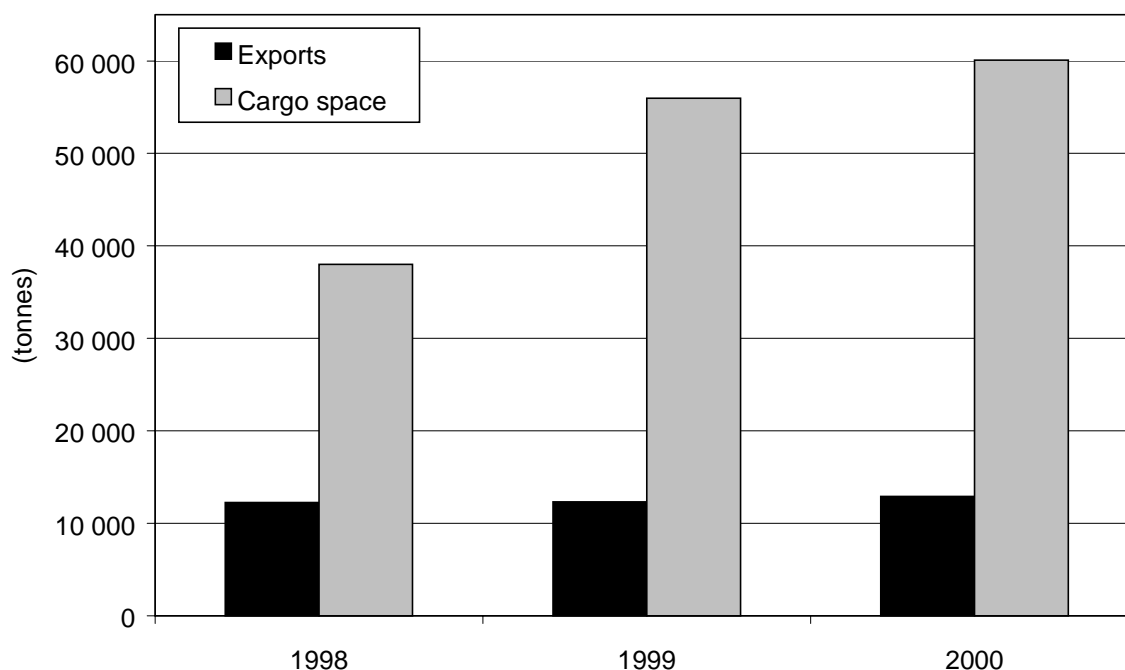
In addition to the growth in the market for seats to Malaysia, there has been a significant change in supply of dedicated freighter capacity. During 1998, Martinair entered the market but left again in early 1999. At the same time (Northern Summer 1999) Malaysian Airlines increased its dedicated freight flights from one to four flights per week. This had the effect of making available around 5000 tonnes of cargo space per quarter in the Australia-Malaysia market. This results in an increase in total cargo capacity (dedicated and belly-hold) of 47 per cent in 1999 (to 56 000 tonnes) and seven per cent in 2000 (to 60 100 tonnes).

#### *Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 35 illustrates the result. On the basis of the assumptions of the scenario outlook, it

appears that Australian exporters to Malaysia will not face any significant air freight capacity constraints in the short- to medium-term.

FIGURE 35 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO MALAYSIA—1999–2000



Source BTE analysis.

## Philippines

### *Exports (by air)—1996–1998*

The Philippines is a ‘medium’ sized market for Australian air exports. In 1998, 4565 tonnes of Australian commodities were exported by air to the Philippines.<sup>39</sup> The Asian crisis had a sizeable impact on the Philippines’ demand for Australian exports, which fell by 32 per cent in 1998. Prior to this, exports had enjoyed substantial growth of 56 per cent (increasing from 4330 tonnes in 1996 to 6743 tonnes in 1997).

### *Major export groups*

During 1996–1998, *fresh vegetables* and *medicinal products* have been the top two commodity groups exported by air to the Philippines (together representing 29 per cent of total exports in 1998). *Fresh vegetables* have consistently been the top

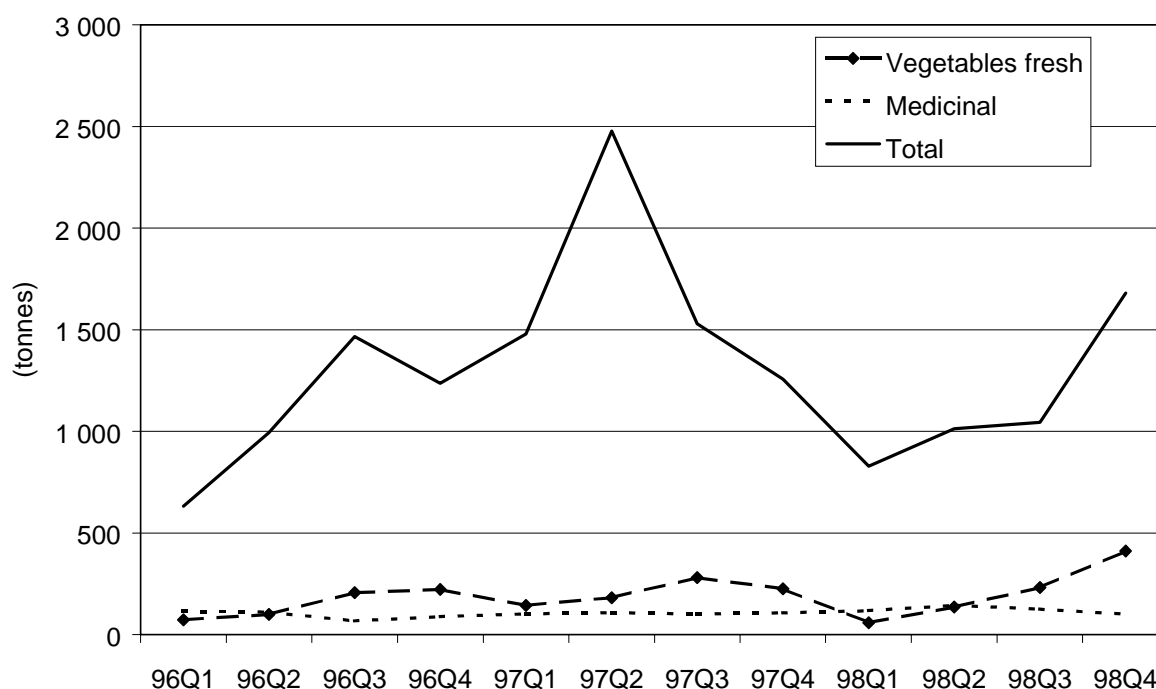
<sup>39</sup> 4565 tonnes of air freight were flown from Australia and ‘unloaded’ in the Philippines in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, of this 4565 tonnes, 4518 tonnes were recorded by freight forwarders/exporters as ‘destined’ for the Philippines. In other words, 46 tonnes (or one per cent) was for transshipment to other markets.



commodity group, with 18 per cent of total exports in 1998. After 38 per cent growth in 1997, *fresh vegetables* held their ground in 1998, managing to maintain growth of one per cent despite the adverse impact of the Asian crisis on overall exports. *Medicinal products* also remained unaffected by the financial crisis, increasing 16 per cent in 1998 after ten per cent growth in 1997. The commodities experiencing the largest falls in 1998 occurred in the *telecommunications* and *other* categories.

Figure 36 illustrates a three-year quarterly history of these major commodity groups. The large spike in the second quarter of 1997 appears to be the result of a one-off rise in the other commodities category, a residual category encompassing commodity groups outside the top 15. Specifically, *feeding stuff for animals* experienced a massive increase in that quarter.

FIGURE 36 AIR FREIGHT EXPORTS TO THE PHILIPPINES—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### Food exports

Four of the top 15 commodity groups exported to the Philippines in 1998 were food, representing 28 per cent of total exports. In addition to *fresh vegetables*, *dairy products*, *meat* and *preserved fruit* were the major food commodities exported to the Philippines in 1998. *Dairy products* fell by seven per cent in 1998, after growth of six per cent in 1997. *Meat* also dropped 16 per cent in 1998, after 20 per cent growth in 1997. Both of these commodity groups appear to have fallen as a result of dampened demand due to the Asian crisis. *Preserved fruit* fell substantially in 1997 (61 per cent) and marginally in 1998 (one per cent).

Table 26 provides more detail on the quantities of various commodity groups exported to the Philippines over 1996-98.

**TABLE 26 MAJOR COMMODITIES EXPORTED BY AIR TO THE PHILIPPINES—1996–1998**

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	<i>(tonnes)</i>											
Vegetables fresh	73	99	206	222	144	182	280	226	58	136	232	411
Other commodities	82	100	117	127	47	108	205	129	88	133	118	278
Medicinal	115	111	67	89	102	108	102	107	117	145	125	100
Misc manufactured	14	12	18	44	64	134	35	38	51	101	134	94
Photographic etc	1	3	1	4	63	54	120	46	66	40	61	82
Dairy products	57	35	37	58	42	54	39	62	42	47	41	53
Electrical	11	15	25	14	18	8	22	15	9	21	11	26
Manufactures of metal	4	13	7	5	7	28	8	14	16	35	48	24
Meat	57	45	50	67	59	75	63	66	103	62	34	23
General industrial	21	23	21	20	30	25	24	17	15	15	23	21
Textiles	10	10	8	13	12	29	9	6	8	11	22	19
Machinery specialised	21	21	13	20	22	12	16	68	25	43	27	19
Telecommunications	9	9	34	61	26	30	12	31	23	12	8	16
Non-ferrous metals	1	7	3	19	3	5	8	29	49	104	14	9
Fruit preserved	43	10	5	12	6	13	4	4	10	15	1	1
Other	114	482	857	462	835	1 612	583	401	149	93	144	506
<b>Total</b>	<b>632</b>	<b>994</b>	<b>1 467</b>	<b>1 237</b>	<b>1 480</b>	<b>2 477</b>	<b>1 529</b>	<b>1 257</b>	<b>828</b>	<b>1 012</b>	<b>1 044</b>	<b>1 681</b>

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### *Airlines, flights and cargo capacity*

Four airlines flew between Australia and the Philippines in 1998—Philippine Airlines, Qantas, Federal Express and Polar Air Cargo. All airlines flew direct routes. However, Philippine Airlines dropped out of the market in the third quarter of 1998 and did not resume services.

In total, there were 630 flights available in 1998, of which 496 (or 79 per cent) used passenger aircraft and 134 (or 21 per cent) used dedicated freight aircraft. This translated to 120 000 seats being offered to the Australia–Philippines market and belly-hold cargo capacity of 7500 tonnes for the year. Federal Express, a dedicated freight carrier, entered the market in the third quarter of 1998 and Polar Air Cargo joined them in the last quarter. Federal Express is the main dedicated freight provider in this market. It began to use Subic Bay in the Philippines as a regional hub for its operations and continued to increase services in the last quarter of 1998. Together, the dedicated freight services made available around 5100 tonnes of cargo space in 1998, which represented 40 per cent of the total capacity of 12 600 tonnes. Dedicated freight is therefore an important part of the Australia–Philippines aviation market.

During the course of 1998, the number of flights from Australia to the Philippines fell from 195 in the first quarter to 149 in the fourth quarter (a 24 per cent decline). This drop in flights led to a corresponding fall in available seats (50 per cent). In contrast to this drop in the number of seats, cargo space increased slightly (three per cent).<sup>40</sup> This was a result of passenger flights falling 56 per cent but freight flights increasing 431 per cent with the entry of Federal Express in the last half of 1998. The large fall in passenger flights was due to the closure of Philippine Airlines in the third quarter of 1998.

Table 27 summarises the quarterly breakdown of flights and cargo capacity by aircraft type.

**TABLE 27 ESTIMATES OF CARGO SPACE AVAILABLE TO THE PHILIPPINES—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A340	117	96	0	0	213
	B767	65	65	73	18	221
	B747	0	0	0	62	62
	B747F	13	13	13	13	52
	MD11F	0	0	26	56	82
	Total	195	174	112	149	630
Seats	Passenger	44 000	37 000	17 000	22 000	120 000
	Cargo capacity (t)					
Passenger	Passenger	3 100	2 800	800	800	7 500
	Freighter	400	400	1 500	2 800	5 100
	Total	3 500	3 200	2 300	3 600	12 600

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

*Source* BTE estimates.

### *Alignment of supply and demand—1998*

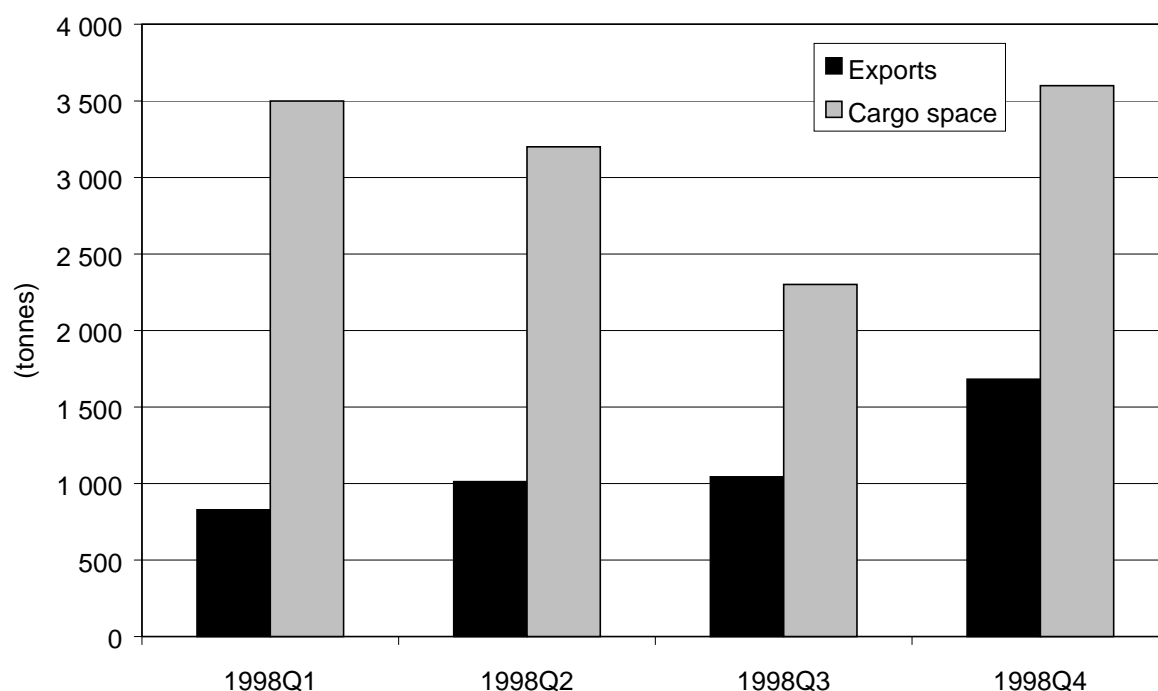
Comparing the demand for cargo space (the quantity of commodities exported by air to the Philippines) with the amount of export cargo space airlines made available to this market in 1998 provides a first-order assessment of the existence or extent of any demand pressures being experienced by the air freight link of the logistics chain between Australia and the Philippines.

Figure 37 shows the quarterly air freight supply and demand to the Philippines in 1998. Capacity utilisation rates are well below critical levels for 1998, indicating that there were no capacity problems facing exports to the Philippines during this period. However, the figure does illustrate two important features of this market. First, the operations of Federal Express are critical to exporters—without its entry into the

<sup>40</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

market in the last half of 1998, demand pressures would have reached serious levels as a result of Philippine Airlines' exit. Second, with only two passenger airlines serving the market, the exit of Philippine Airlines (which was flying large Airbus 340 aircraft) in response to passenger market trends had a dramatic impact on the supply of belly-hold freight. Qantas responded to this change by switching from Boeing 767 to the larger Boeing 747(SP) aircraft. While this aircraft carries a significantly larger number of passengers than the Boeing 767, its cargo capacity is less than that of a 767. Consequently, the Qantas response had little impact on available cargo space in the last half of 1998.

**FIGURE 37 AIR CARGO SPACE SUPPLY AND DEMAND TO THE PHILIPPINES—1998**



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

The multitude of variables required to definitely predict future air freight capacity supply and demand to the Philippines puts the task beyond the scope of this study. Under certain assumptions about the Philippine market, however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this type of scenario analysis can then be used as a guide to future supply and demand under the conditions assumed. The following sections develop such a scenario.

*The Philippines' economy and prospects for food exports*

The outlook for the Philippine economy (population 70 million and GDP per capita \$US 900 in 1998)<sup>41</sup> is for recovery and a return to growth in 1999 after the slowdown of 1998. Economic growth will pick up, but continue to remain below the above five per cent levels experienced pre-1997. The slowdown in growth is a result of the financial crisis; however, importantly, the Philippines' performance during this troubled economic time exceeded government and International Monetary Fund (IMF) expectations (Supermarket to Asia, 1998h, p. 8). According to the IMF (1999), the outlook for Philippines in terms of real GDP growth is -0.5 per cent in 1998, 2.0 per cent in 1999 and 3.0 per cent in 2000.

The Philippines is a growing market for Australian exports, with a rapidly rising population expected to reach 84 million by 2005 (Supermarket to Asia, 1998h, p. 5). The strong growth performance is a result of expansion in both the construction and electronics sectors and the general belief that the Philippines' economy is fundamentally sound, unlike many of its neighbours. The recent slowing in growth to marginally negative levels is attributed to declines in business confidence and some external debt problems, which resulted in currency volatility. Both these factors stem from the financial crisis. Speculative attacks on the currency led the government to adopt a floating exchange rate system during 1998.

Over the short term, Supermarket to Asia (1998h) predicts that trade to the Philippines will be constrained, as the reduced purchasing power of consumers continues to impact on demand for imported goods. Over the medium term, Supermarket to Asia (1998h) anticipates that the Philippines will increase in its importance as a destination for Australian exports. Expected contributing factors include the rapidly growing population, ongoing trade liberalisation and accelerated tariff reductions, a relatively inefficient agricultural sector and a considerable reliance on imported foods.

*Demand for air freight capacity*

Major food items have consistently represented more than 20 per cent of total air exports to the Philippine market (28 per cent in 1998). While this is not as large as for some other countries, they will still be important commodities to take into account when formulating a scenario for future air freight capacity demand. It is also important to note that food items not in the top 15 are classified in the other category, meaning that the actual proportion of food exports is likely to be higher than 20 per cent. Detailed information on food exports provided by Supermarket to Asia makes it possible to separate major food commodity groups from the rest of exports. Supermarket to Asia (1998h) forecasts that food exports to the Philippines will expand significantly when current economic difficulties are overcome.

As discussed, the outlook for the Philippine economy is for recovery and a return to growth in 1999, strengthening in 2000. Table 28 indicates that Australia's major food exports to the Philippines suffered a small contraction (four per cent) in demand in

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<sup>41</sup> Supermarket to Asia (1999h), J.P. Morgan (1999).

1998 in response to the economic crisis, after enjoying considerable growth in 1997. 'Other' exports (representing more than 70 per cent of air exports) experienced much larger declines in demand, dropping almost 40 per cent in 1998 after 67 per cent growth in 1997. It appears, therefore, that exports are far more sensitive to economic fluctuations than are food exports from Australia.

As a result of this strong historical trade picture, positive IMF growth forecasts and Supermarket to Asia's optimistic medium-term views it is assumed that food will resume growth (six per cent) in 1999 and strengthen further in 2000 (eight per cent growth). It is also assumed that after such a large fall, 'other' exports to the Philippines have hit bottom and will begin to rebound in 1999 with five per cent growth followed by 12 per cent in 2000. The less severe nature of the financial crisis in the Philippines results in the scenario of both food and 'other' imports recovering relatively quickly, with food equal to 1997 levels in 1999 and 'other' commodities remaining below 1997 levels over the short term. The high proportion of 'other' commodities leads to total exports remaining below 1997 levels, despite the recovery of the food sector.

Table 28 summarises the historical and projected scenario data for the Philippines.

**TABLE 28 SCENARIO OUTLOOK FOR AIR FREIGHT TO THE PHILIPPINES**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	5.9	5.2	-0.5	2.0	3.0
Food (annual % change)		22	-4	6	8
Other (annual % change)		67	-39	5	12
Food (tonnes)	1 076	1 318	1 270	1 300	1 500
Other (tonnes)	3 254	5 425	3 295	3 500	3 900
Total (tonnes)	4 330	6 743	4 565	4 800	5 400

Sources: International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

The Australia–Philippines aviation market was served predominantly by passenger aircraft in 1998, but dedicated freight aircraft did constitute an important part of the market. It is unlikely that this will change in the near future. To construct plausible scenarios for the future supply of freight capacity it is therefore imperative to examine both the future supply of passenger and freight services.

The supply of passenger aircraft is determined by passenger demand and government regulations in the market, not the demand for freight capacity. The Australia–Philippines bilateral air service agreement currently has significant unutilised capacity in the passenger market. Dedicated freight capacity of 300 tonnes per week has been negotiated in the agreement subject to finalisation of routes. Neither Australian nor Philippine airlines are currently utilising this dedicated freight capacity. The only dedicated freight airline currently operating in the Australia–Philippines market is Federal Express (a US airline).

The evolution of the Australia–Philippines passenger market is shown in figure 38 which displays an eight-year time series of origin-destination (OD) and uplift–discharge (UD) traffic between the countries. Philippine visitors to Australia grew at an average annual rate of 18 per cent between 1991 and 1997, while Australians visiting the Philippines grew at a rate of seven per cent. The number of Australian visitors to the Philippines has consistently exceeded the number of Philippines visiting Australia over the last eight years. Australian and foreign OD traffic have both shown similar trend growth during the eight-year period.

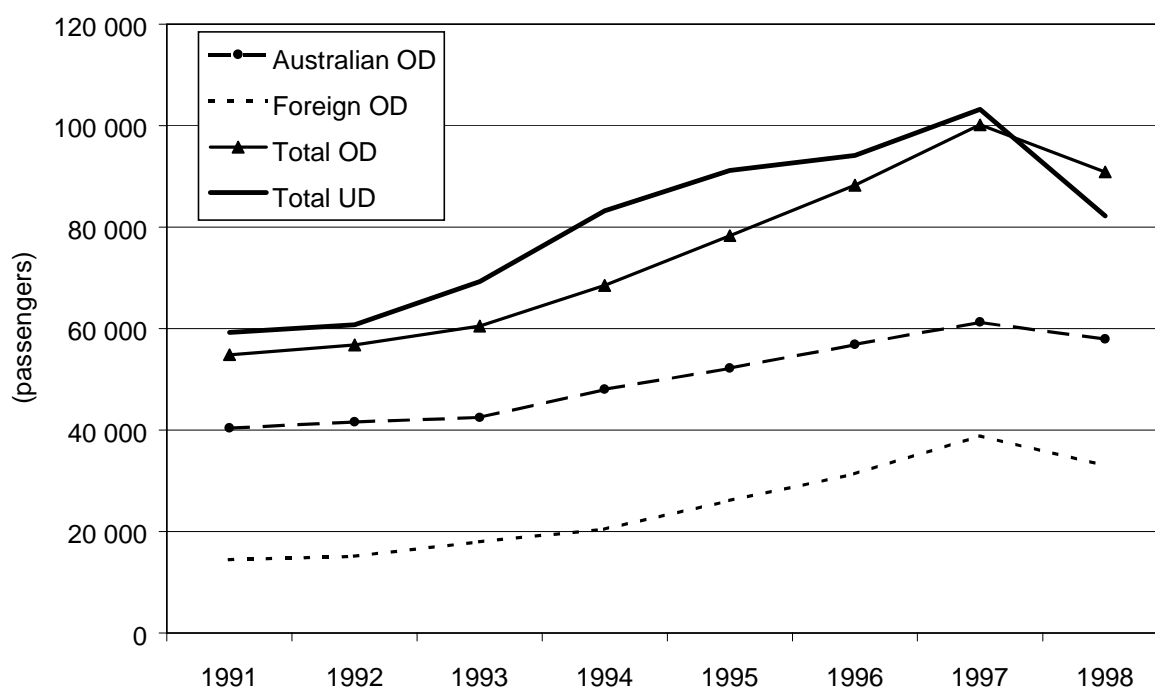
The total number of Philippine visitors to Australia declined for the first time in 1998 (by 15 per cent), after 24 per cent growth in 1997. Australians visiting the Philippines also dropped (by six per cent) in 1998 following eight per cent growth in 1997. These traffic declines are a result of the financial crisis reducing the demand for travel to Australia. The fall in the number of Australians visiting the Philippines contrasts with increases in Australian traffic to other Asian countries affected by the crisis due to favourable relative exchange rates which made travel to these countries cheaper. The decline in Australians visiting the Philippines may be a result of several factors. The Philippine currency was fixed for part of 1998 and the Philippine market did not experience the same level of crisis (or currency depreciation) as other Asian countries (despite a significant depreciation in the peso the favourable relative exchange rate incentive for travel may not have existed). The exit of Philippine Airlines from the market in June 1998 reduced the number of seats available and may have also deterred Australians from visiting the Philippines.

From 1991 to 1997, both OD and UD data reflect the general upward trend present in the Australia–Philippines aviation market. In 1998, however, both OD and UD traffic fell by nine and 20 per cent respectively as the Asian crisis took effect and Philippine Airlines stopped operating to Australia. The larger decline in UD traffic caused a crossover where UD fell below OD traffic for the first time in the period. This meant that rather than a small proportion of passengers using the Philippines as an intermediate stop en route to their destination (as had occurred pre-1997), passengers destined for the Philippines began using more indirect flights via another country to get to the Philippines.

Visitor arrival growth rate forecasts from the Tourism Forecasting Council (1999) were not available for the Philippines as it was included in a ‘remaining other Asia’ category. The average annual growth rate forecast for this category over the next ten years is 11.6 per cent (Tourism Forecasting Council, 1999).

As a result of high historical passenger growth and the generally positive economic outlook for the Philippines, it is assumed that Philippine visitors to Australia will recover back to growth in 1999 (six per cent) and strengthen further in 2000 (12 per cent) but remain below pre-1997 growth rates of more than 20 per cent. This would mean that foreign OD passengers would recover and just surpass 1997 levels by 2000. It is also assumed that the number of Australians visiting the Philippines will recover with four per cent growth in 1999 and return to 1991–1997 average annual growth of seven per cent in 2000. Again, this would lead to Australian OD passengers surpassing pre-crisis levels by 2000.

FIGURE 38 AUSTRALIA-PHILIPPINES AIR PASSENGER MARKET—1991-1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

Assuming relatively constant load factors and aircraft, these assumptions lead to a total scenario of increasing demand for seats in the market in 1999 (five per cent) and 2000 (nine per cent). For Qantas to respond by increasing capacity would mean adding another Boeing 747 flight per week—this would be too large an increase in response to only a five per cent increase in demand. As a result, the 1999 air service agreement shows that Qantas remains the only passenger airline serving the market and maintains the six flights per week offered during the last half of 1998. By 2000, after a five per cent increase in demand for seats in 1999 and nine per cent increase in 2000, it is assumed that Qantas does respond by adding an extra flight per week, therefore expanding belly-hold freight capacity. After entering the market in the last half of 1998 and increasing operations from two to five flights per week, Federal Express maintained this profile for 1999. It is assumed that this profile remains unchanged in 2000. The 1999 air service agreement also shows that Polar Air Cargo, the other dedicated freight airline, ceased operating its weekly service to Manila.

As the Australia-Philippines aviation market consisted of only two passenger airlines, the exit of Philippine Airlines in 1998 had a profound effect on belly-hold freight capacity between the two countries. The exit of Philippine Airlines was a result of several factors. The devaluation of the peso and a prolonged pilots' strike in mid-1998 followed by widespread industrial action led to the airline suffering unsustainable financial losses, causing debt to increase to a point where the airline was unable to meet its repayments. The airline's debt has been estimated at US \$2.1 billion (Grindrod, 1998, p. 4). Philippine Airlines went into receivership in mid-1998 and closed down on 23 September 1998. There have been attempts since to



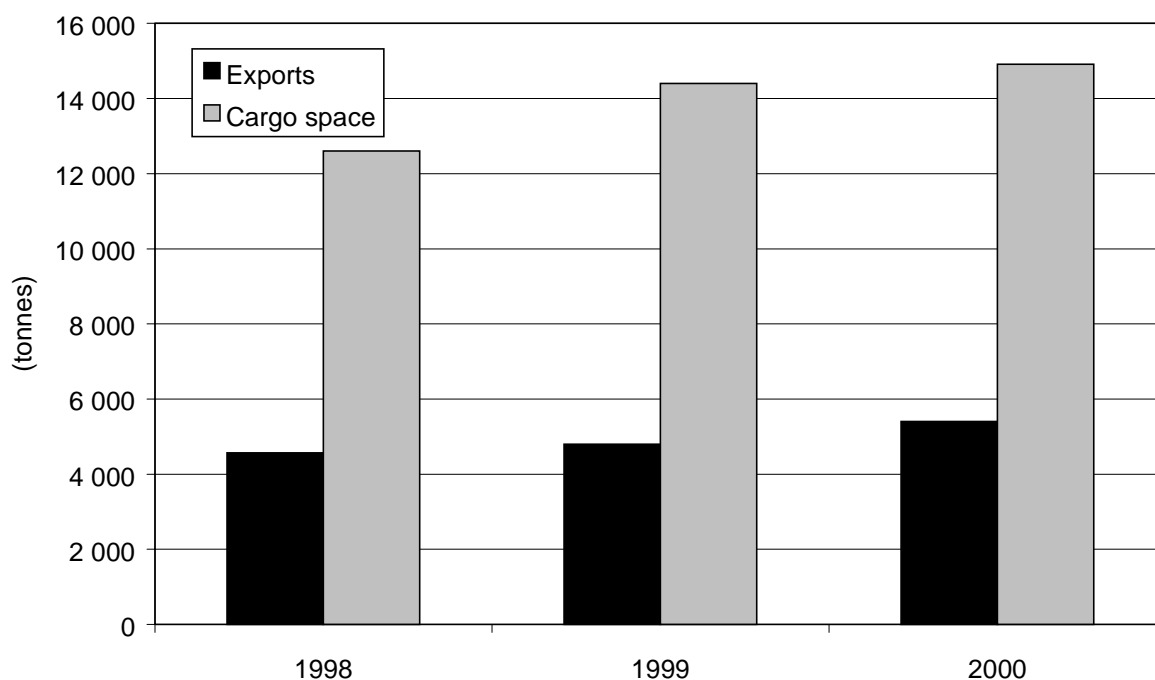
revive the airline. It was re-opened in October 1998 with severely reduced operations and rehabilitation plans have been put in place. Luftansa Consult, the consulting arm of the German flag carrier, has signed a 26-month deal with Philippine Airlines to advise its management on rebuilding the airline (Grindrod, 1999, p. 22). However, even if these latest attempts to save the airline are successful, it is unlikely that Philippine Airlines will re-enter the Australian market in the short- to medium-term future.

The continued absence of Philippine Airlines, the exit of one dedicated freighter and Qantas' switch to Boeing 747 (SP) aircraft with smaller freight capacity are outweighed by the Federal Express operations, together translating to a 14 per cent increase in cargo capacity in 1999 to 14 400 tonnes. By 2000, the additional service by Qantas plus the maintenance of dedicated freight flights will lead to a further increase in cargo capacity of four per cent or 14 900 tonnes.

#### *Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 39 illustrates the scenario outlook. After allowing for the assumptions made, Australian exports to the Philippines are not likely to face air freight capacity constraints in the short- to medium-term future with export demand well below cargo space in both 1999 and 2000. Importantly though, the critical nature of Federal Express in this market must be recognised—if Federal Express were to withdraw services and the rest of the market supply remained as predicted, demand pressures would be likely to appear in this market during 1999 and 2000. Airlines' response to increases in passenger market demand would be inadequate for the freight market.

**FIGURE 39 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO THE PHILIPPINES—1999-2000**



Source BTE analysis.

## Taiwan

### *Exports (by air)—1996–1998*

Taiwan is the second largest ‘medium’ market for Australian air exports after Malaysia. In 1998, 8092 tonnes of Australian commodities were exported by air to Taiwan.<sup>42</sup> This represents a small decline (approximately six per cent) compared to 1997 when 8592 tonnes were exported, reflecting the effects of the Asian crisis on consumer demand.

#### *Major export groups*

During 1996–1998, *fresh vegetables* followed by *crustaceans*, *molluscs* and *preserved crustaceans* have been the top three commodity groups exported by air to Taiwan (together representing 54 per cent of total exports). *Fresh vegetable* exports represented 22 per cent of total exports in 1998, up from only five per cent in 1996. The demand for *fresh vegetables* exhibits high seasonality and experienced phenomenal growth during the period, increasing 129 per cent in 1998 despite the Asian crisis. In contrast, the share of *crustaceans*, *molluscs* was about 20 per cent in 1998 or 1623 tonnes, down from 2350 tonnes in 1997 (a more than 30 per cent decline). Demand for *crustaceans*, *molluscs* were also very seasonal, peaking in the first quarter of each year. *Preserved crustacean* exports represented around 11 per cent of total exports to Taiwan in 1998. This commodity has been in constant decline over the period, falling by 24 per cent in 1997 and by almost 40 per cent in 1998.

Figure 40 illustrates a three-year quarterly history of these major commodity groups.

#### *Food exports*

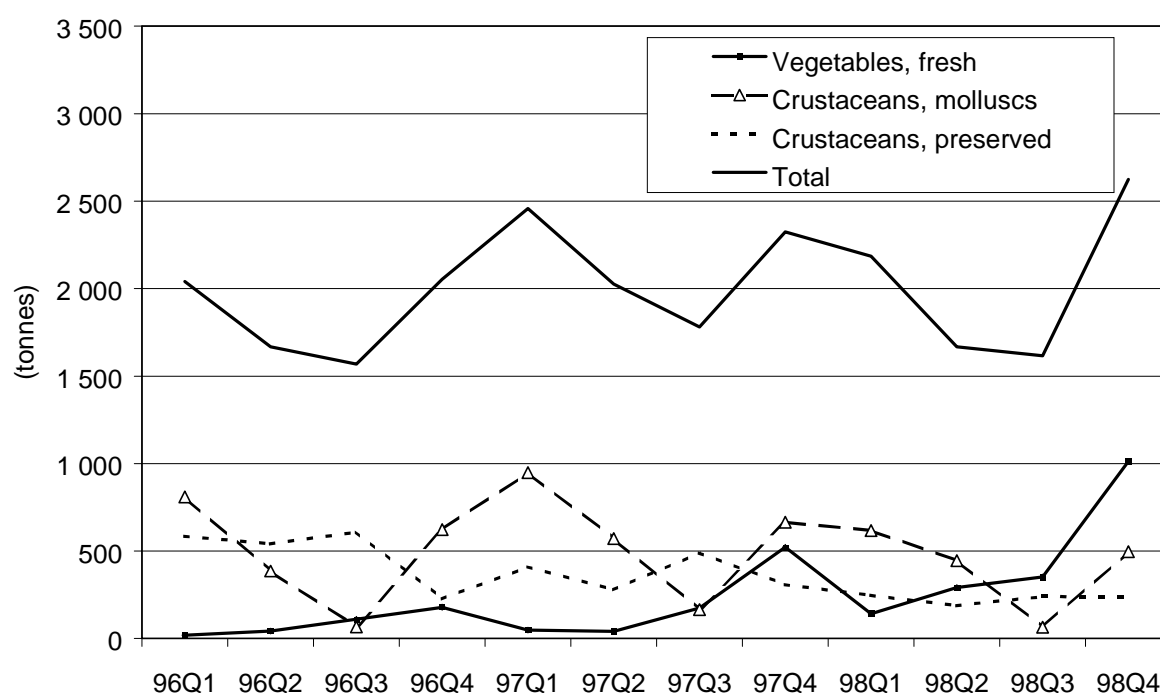
Major food items comprised six out of the top 15 commodity export groups during 1996–98, consistently representing more than 60 per cent of total air freight to Taiwan.

In addition to the *fresh vegetables*, *crustaceans*, *molluscs* and *preserved crustaceans* already discussed, Australia also exported *beverages*, *fish* and *meat*. All three of these foods represent only a very small proportion of total exports and are growing from very low bases. Both *beverages* and *meat* continued to grow rapidly in spite of the Asian crisis and the six per cent decline in overall exports. However, *fish* suffered an almost 20 per cent decline in 1998.

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<sup>42</sup> 8092 tonnes of air freight were flown from Australia and ‘unloaded’ in Taiwan in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, 9175 tonnes were recorded by freight forwarders/exporters as ‘destined’ for Taiwan. In other words, 1083 tonnes (or almost 12 per cent) went to Taiwan via other countries (on indirect flight routings).

FIGURE 40 AIR FREIGHT EXPORTS TO TAIWAN—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

Table 29 provides more detail on the quantities of various commodity groups exported to Taiwan over 1996–98.

TABLE 29 MAJOR COMMODITIES EXPORTED BY AIR TO TAIWAN—1996–1998

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Vegetables, fresh	19	42	109	179	49	41	175	521	142	291	352	1 012
Crustaceans, molluscs	808	386	66	623	949	571	166	664	617	446	64	496
Crustaceans, preserved	584	541	608	226	409	278	490	308	246	188	239	237
Photographic etc	132	139	118	121	129	113	134	124	132	105	116	89
Medicinal	32	35	79	52	33	38	48	71	79	88	76	59
Office machines / ADP	75	83	122	117	115	142	93	75	72	49	61	51
Beverages	3	4	1	8	13	14	13	24	38	20	4	46
Fish	45	89	146	74	57	107	170	59	50	86	142	42
Misc. manufactured	25	32	30	40	33	43	43	61	44	29	46	41
Crude animal & veg	12	26	37	40	13	32	56	45	10	40	53	36
Essential oils	12	22	12	21	13	20	9	22	14	33	43	27
Meat	6	9	8	4	2	10	17	45	63	23	32	22
General industrial	35	22	19	16	17	20	23	21	14	31	26	20
Electrical	21	31	38	10	8	20	19	51	23	21	41	12
Miscellaneous edible	17	5	5	8	4	13	59	6	13	24	10	9
Other	215	202	170	514	616	565	268	229	629	195	311	426
<b>Total</b>	<b>2 040</b>	<b>1 667</b>	<b>1 568</b>	<b>2 054</b>	<b>2 459</b>	<b>2 027</b>	<b>1 781</b>	<b>2 325</b>	<b>2 185</b>	<b>1 667</b>	<b>1 616</b>	<b>2 624</b>

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source: BTE analysis of ABS International Cargo Statistics (unpublished).

**Air cargo capacity—1998***Airlines, flights and cargo capacity*

Six airlines—Mandarin, Qantas, Ansett International, Polar Air Cargo, Air New Zealand and Eva Air—flew either directly or indirectly between Australia and Taiwan in 1998.

There were 887 flights available in 1998, of which 803 (91 per cent) used passenger aircraft and the remaining 84 used dedicated freighters. These dedicated freight services made available around 1300 tonnes of cargo space, representing 14 per cent of the total annual capacity of 9200 tonnes. In terms of number of flights, dedicated freight flights represented ten per cent of total flights for the year.

During the course of 1998, the number of flights from Australia to Taiwan fell from 237 in the first quarter to 182 in the fourth quarter (a 23 per cent decline). The number of seats and available cargo space also experienced significant declines (19 and 17 per cent respectively).<sup>43</sup> Despite this overall decline, all three measures of capacity recorded increased capacity in the second quarter of 1998 with increases of four per cent in flights, 12 per cent in seats and 22 per cent in available cargo space. This was a result of increased use of the larger Boeing 747 aircraft rather than Boeing 767s. In the fourth quarter of 1998, the number of Boeing 747s dropped, as both Ansett and Mandarin reduced flights. This fall in passenger flights did not affect cargo capacity because the New Zealand leg of the routes flown in the third quarter was discontinued, making available 100 per cent of the cargo space for Australian cargo. This compensated for the decline in flights, which otherwise would have resulted in a reduction in cargo space at a time when exports were reaching their seasonal peak. Table 30 summarises the quarterly breakdown of flights and cargo capacity by aircraft type.

**TABLE 30 ESTIMATES OF CARGO SPACE AVAILABLE TO TAIWAN—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	B747	65	91	65	45	266
	B767	146	130	130	131	537
	B747F	26	26	26	6	84
	Total	237	247	221	182	887
Seats	Passenger	57 000	64 000	53 000	46 000	220 000
Cargo capacity (t)	Passenger	1 900	2 400	1 800	1 800	7 900
	Freighter	400	400	400	100	1 300
	Total	2 300	2 800	2 200	1 900	9 200

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

<sup>43</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

*Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to Taiwan) with the amount of export cargo space airlines made available in 1998 provides a first-order assessment of the existence or extent of any demand pressures experienced by the air freight link of the logistics chain between Australia and Taiwan.

Figure 41 shows the quarterly air freight supply and demand to Taiwan in 1998. It shows that for the second and third quarters of 1998, less than 75 per cent of available capacity was being utilised, suggesting that no capacity constraint existed.<sup>44</sup> However, for both the first and last quarters of 1998, the data appear to show serious pressures, with much higher utilisation rates of 95 per cent in the first quarter and exports actually exceeding the cargo space provided by 38 per cent in the fourth quarter.

During 1998, the dedicated freight airline Polar Air Cargo flew to Taiwan indirectly through Manila and Singapore before going on to other markets. US airlines such as Polar Air have no freight entitlements to North Asia unless they transit a South-East Asian port (Aviation Division, DoTRS, pers. comm.). As a result, some flights to Taiwan were excluded from the analysis.

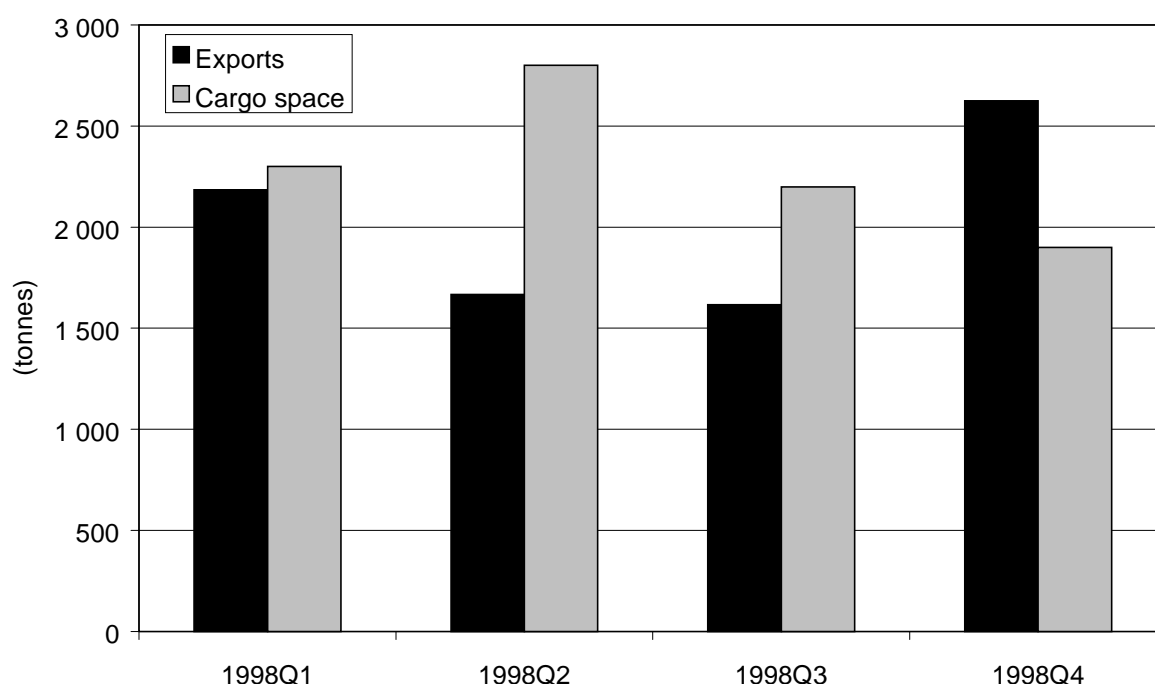
The excess of demand over supply in the fourth quarter may have resulted from several factors. Polar Air Cargo may have reallocated space for freight destined for Taiwan. However, assuming that all space on indirect freighter flights was allocated to Taiwan would still mean that supply would fall short of demand in the last quarter of 1998. Lack of information on how dedicated freighters apportion cargo space on these multi-stop flights has made interpretation difficult. A capacity constraint on scheduled services may have led to the market being served by chartered freight flights. Finally, if the 100 per cent load factor assumption on passenger aircraft is ignored and the industry average for 1998 (which was around 75 per cent for this market) is applied instead, the resulting cargo capacity is close to 3000 tonnes, eliminating the shortfall which appeared in the fourth quarter.

Figure 41 shows that seasonal peaks in the export commodity market appear to be the reverse of seasonal trends in the supply of capacity (which is determined by passenger demand). As a result, though both cargo space supply and demand fell in 1998, seasonal misalignment meant that cargo capacity on scheduled services continued to show signs of being constrained in the first and last quarters presumably due to changes in passenger markets.

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<sup>44</sup> The work of Douglas and Miller (1974) was drawn on in interpreting at what level of cargo capacity utilisation an air freight network is approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to encounter capacity constraints in the overall network. As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.

FIGURE 41 AIR CARGO SPACE SUPPLY AND DEMAND TO TAIWAN—1998



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

Overall, figure 41 indicates that no capacity constraints were occurring in the middle of 1998. However, it seems reasonable to conclude that for both the first and last quarters of 1998, some exporters would have faced constraints in purchasing guaranteed space on scheduled services. In particular, the export of *fresh vegetables*, one of the major export groups, is subject to large seasonal trends, peaking in the final quarter of each year. Even allowing for the assumptions made, cargo capacity to Taiwan was clearly constrained in the fourth quarter of 1998.

### ***Outlook for the air freight sector***

The multitude of variables required to definitely predict future air freight capacity supply and demand to Taiwan puts the task beyond the scope of this study. Under certain assumptions about the Taiwanese market, however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this type of scenario analysis can then be used as a guide to future supply and demand under the conditions assumed. The following sections develop such a scenario.

#### ***Taiwan's economy and prospects for food exports***

The outlook for the Taiwanese economy (population 21 million and GDP per capita \$US 11 700 in 1998)<sup>45</sup> is for economic conditions to continue to slowdown over the short term and for growth to pick up again in the medium term. The slowdown (from a growth rate of 6.8 per cent in 1997) is in response to the financial crisis.

<sup>45</sup> Supermarket to Asia (1999i), J.P. Morgan (1999).

According to the International Monetary Fund (1999), the outlook for Taiwan in terms of real GDP growth is 4.9 per cent in 1998, 3.9 per cent in 1999 and 4.8 per cent in 2000.

Despite the reduction in the rate of growth, the Taiwanese economy has fared better than most Asian economies, managing to maintain a strong and relatively stable growth rate due to having almost no foreign debt and ample foreign reserves. However, the subdued economic growth is likely to dampen consumer demand and constrain growth in imported foods over the short term. Over the medium- to longer-term, Supermarket to Asia (1998i) anticipates that Taiwan will grow in importance as a destination for Australian food exports. They identify further deregulation, the development of retail and food service sectors and declines in domestic food production as factors behind this expected growth.

#### *Demand for air freight capacity*

Given that the top food items have consistently represented the bulk (around 60 per cent) of total air exports to the Taiwanese market, they clearly will be the critical commodities to take into account when formulating a scenario for future air freight capacity demand. This, in addition to the more detailed information on food exports provided by Supermarket to Asia makes it possible to separate major food commodity groups from the rest of exports. Supermarket to Asia (1998i) forecasts that food exports to Taiwan will continue to rise despite current economic difficulties.

As discussed, the outlook for the Taiwanese economy is a slowing down in growth to 3.9 per cent in 1999, followed by a recovery to 4.8 per cent in 2000. It is assumed that the continued slowdown in growth in 1999 means that the economy remains relatively flat and that the export profile of 1998 is still representative of 1999. Table 31 indicates that Australia's major food and 'other' exports to Taiwan both fell in 1998 in response to the reduced growth. 'Other' exports, representing almost 40 per cent of air exports to Taiwan, increased by 26 per cent in 1997 but fell by seven per cent in 1998. Major food exports increased by 12 per cent in 1997 but fell by five per cent in 1998. These negative results for 1998 may reflect the initial reaction of the Taiwanese to the Asian crisis unfolding around them, which led them to reduce consumption of luxury commodities such as imported crustaceans. In other words, reduced consumer confidence is likely to be the reason for the significant falls in exports to Taiwan at a time when growth had fallen but remained strong, especially when compared to most of its neighbours. Despite the falls, exports of both major food and 'other' commodity groups were above 1996 levels in 1998.

As a result of this and Supermarket to Asia's medium term views, food exports to Taiwan are assumed to remain stable in 1999 and to resume growth (five per cent) in 2000. This is assumed to occur as consumer confidence returns and as it becomes apparent that Taiwan did not suffer the severe crisis many of its Asian neighbours did. Trade data for 1996–98 shows that 'other' exports were no more or no less affected than food exports by the crisis, and as such, these exports are expected to follow a similar path to food exports, remaining stable in 1999 and resuming growth in 2000.

Overall, based on the historical trade data, Supermarket to Asia outlooks and IMF GDP forecasts, the scenario indicates that Australia's total exports to Taiwan will remain flat in 1999, but recover to near-1997 levels in 2000.

Table 31 summarises the historical and projected scenario data for Taiwan.

**TABLE 31 SCENARIO OUTLOOK FOR AIR FREIGHT TO TAIWAN**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	5.7	6.8	4.9	3.9	4.8
Food (annual % change)		12	-5	0	5
Other (annual % change)		26	-7	0	5
Food (tonnes)	4 589	5 151	4 896	4 900	5 100
Other (tonnes)	2 741	3 442	3 197	3 200	3 400
Total (tonnes)	7 329	8 592	8 092	8 100	8 500

Sources International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

The Australia–Taiwan aviation market is served largely by passenger aircraft. In 1998, 91 per cent of flights were passenger services, providing 86 per cent of the air freight capacity available. Over the short- to medium-term future it is reasonable to assume that this market profile will not change significantly. To construct plausible scenarios for the future supply of freight capacity it is therefore necessary to do the same for the future supply of passenger services.

Future freight capacity growth is likely to occur largely in passenger aircraft. The supply of passenger aircraft is determined by passenger demand and government regulations in the market, not the demand for freight capacity. There are no government limits on the growth of freight services—the Australia-Taiwan bilateral air service agreement currently has significant unutilised capacity in the passenger market and unlimited dedicated freighters are permitted to service the market. However, as mentioned earlier, US carriers (such as Polar Air Cargo) are not permitted to carry Australian freight to Taiwan unless they transit a South-East Asian port.

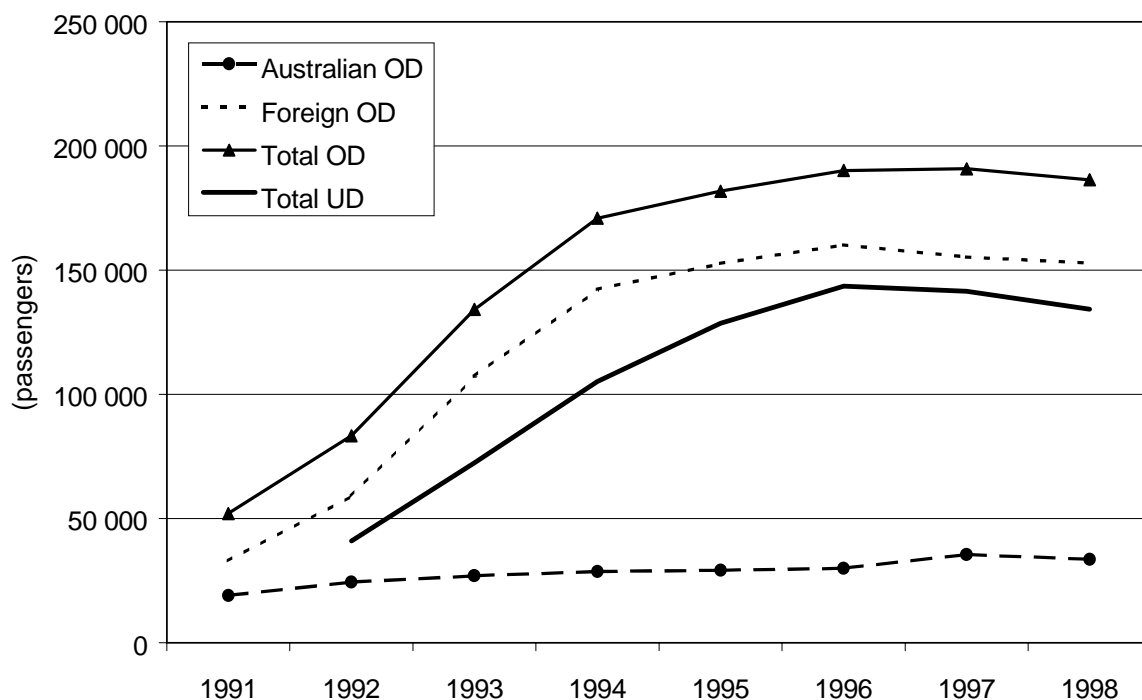
The evolution of the Australia–Taiwan passenger market is shown in figure 42, which displays an eight-year time series of origin–destination traffic (OD) and uplift–discharge (UD) between the countries. Taiwanese visitors to Australia grew at an average annual rate of 29 per cent between 1991 and 1997, while Australians visiting Taiwan grew at a rate of 11 per cent. The number of Taiwanese visitors to Australia has consistently far exceeded the number of Australians visiting Taiwan over the last eight years.

The total number of Taiwanese visitors to Australia fell by two per cent in 1998, reflecting the impact of the Asian crisis. This was on top of a three per cent fall in



1997. After enjoying growth of 19 per cent in 1997, Australians visiting Taiwan dropped five per cent in 1998. Both OD and UD data reflect these generally flat or downward trends over 1997 and 1998. The consistent divergence between OD and UD traffic (with OD exceeding UD) indicates that more than 50 000 passengers were entering Taiwan via other intermediate countries in 1998.

**FIGURE 42 AUSTRALIA-TAIWAN AIR PASSENGER MARKET—1991-1998**



Note Uplift-discharge (UD) data were only available for the fourth quarter of 1991, so the series begins in 1992.

Source Department of Transport and Regional Services, AVSTATS, (1999).

Visitor arrival growth rate forecasts from the Tourism Forecasting Council (1999) predict a two per cent improvement in arrivals from Taiwan in 1999, after falls of two per cent in 1998 and four per cent in 1997. The Tourism Forecasting Council predicts that visitor arrivals from Taiwan will grow by a further seven per cent in 2000. This means that by 2000, visitor arrivals will have surpassed their 1996 peak. Average annual growth of 5.3 per cent is forecast over 1998-2008 (Tourism Forecasting Council, 1999).

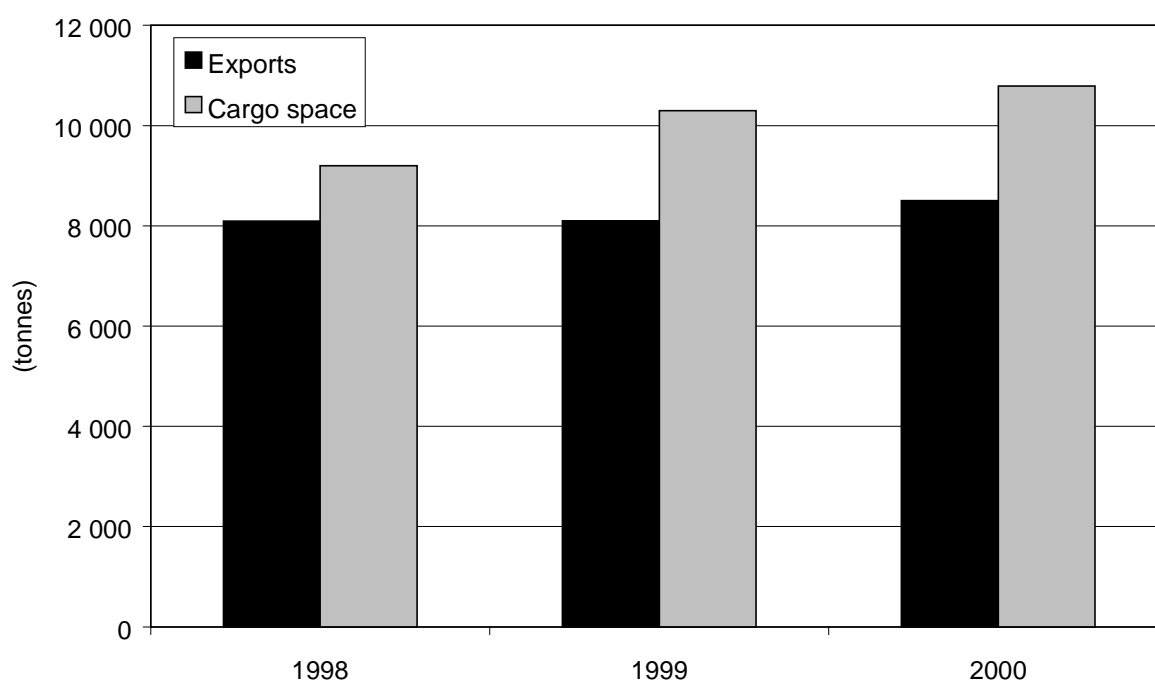
In line with these forecasts, historical passenger data and the general economic outlook for Taiwan, Taiwanese visitors to Australia are assumed to increase by two per cent in 1999 and a further seven per cent in 2000. It is also assumed that the number of Australians visiting Taiwan will continue to grow at the average annual rate of 11 per cent in both 1999 and 2000. These assumptions lead to a scenario of increasing demand for seats in the market in 1999 (four per cent) and 2000 (six per cent). This recovery sees demand for seats increase beyond 1996 and 1997 levels. Based on assumptions regarding load factors and fleet mix, it is assumed that this

will translate into a four per cent rise in belly-hold cargo space on passenger aircraft in 1999 and a six per cent rise in 2000. On the basis of 1999 airline schedules, it is also assumed that Polar Air Cargo will stay out of the market, but Martinair (a Dutch dedicated freight airline) will begin a weekly freighter flight direct to Taiwan. This new service adds around 2000 tonnes to available capacity in both 1999 and 2000. The cargo scenario therefore is that capacity rises to 10 300 tonnes in 1999 and to 10 800 tonnes in 2000.

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998.

**FIGURE 43 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO TAIWAN—1999–2000**



Source BTE analysis.

Figure 43 illustrates the scenario outlook and indicates that, after allowing for the assumptions made, Australian exports to Taiwan will not face any absolute air freight capacity constraints in the short- to medium-term. However, utilisation rates of close to 80 per cent mean that the market is operating under some pressure and that some exporters may face constraints in obtaining guaranteed space on scheduled services, particularly if the seasonal misalignment appearing in 1998 continues.

## Thailand

### *Exports (by air)—1996–1998*

Thailand is one of Australia's 'medium' sized markets for air freight exports—receiving 5051 tonnes in 1998.<sup>46</sup> However, this quantity is considerably down (by 35 per cent) on 1997 levels when 7731 tonnes were exported. This downturn in exports was a result of the severity of the Asian crisis in Thailand. Prior to the crisis the export market exhibited strong growth (18 per cent over 1996–97).

#### *Major export groups*

During 1996–1998, the main commodity group exported by air to Thailand has been *fresh fruit*. However, its proportion has varied over the period from 18 per cent of total exports in 1996 to 23 per cent in 1997 and to only ten per cent in 1998. *Fresh fruit* exports enjoyed 50 per cent growth in 1997 (from 1189 to 1785 tonnes) but fell dramatically (to just 523 tonnes in 1998) once the Asian crisis began to take effect (a fall of 71 per cent).

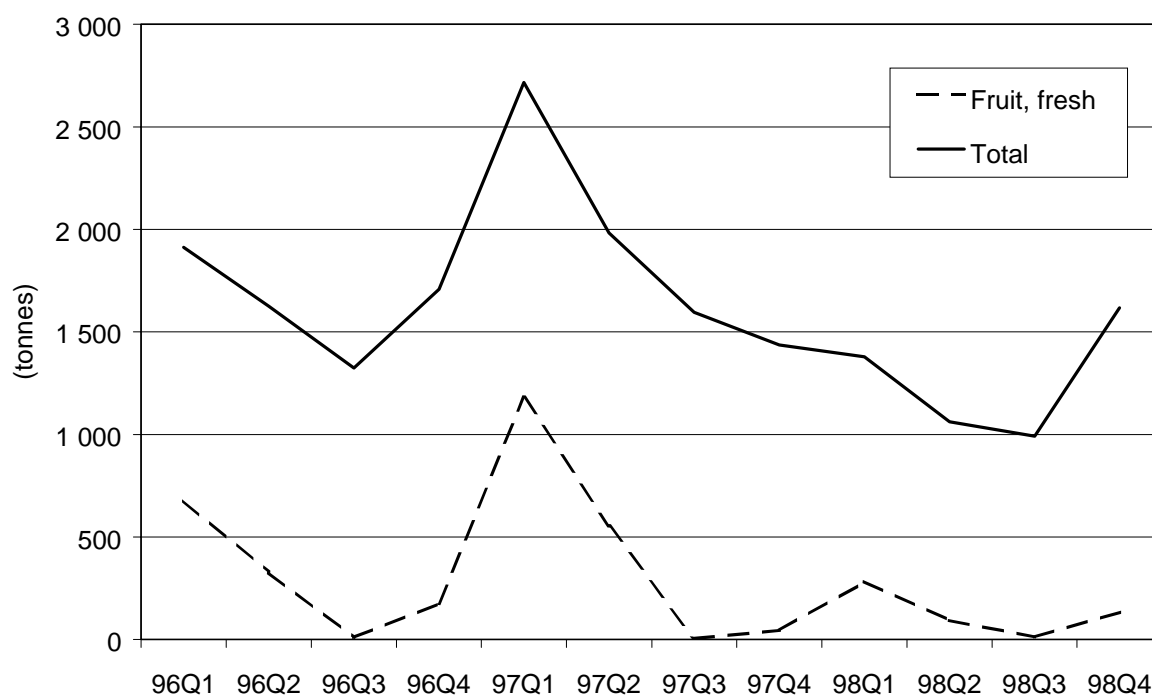
It is interesting to note the effect that *fresh fruit* had on the total export market. Prior to 1998, *fresh fruit* exports drove the Australian export market to Thailand; hence the seasonality of *fresh fruit* caused the total market to reflect the same trend. The strength of this relationship diminished during 1998, as a lack of consumer purchasing power appeared to affect *fresh fruit* more than other commodity groups and its relative importance declined somewhat. At the time, *meat* exports rose in importance, going from only five per cent of the market in 1996 to a 12 per cent share in 1998.

Figure 44 illustrates a three-year quarterly history of these major export groups.

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<sup>46</sup> 5051 tonnes of air freight were flown from Australia and 'unloaded' in Thailand in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, of this 5051 tonnes, 3764 tonnes were recorded by freight forwarders/exporters as 'destined' for Thailand. This suggests that Thailand was used as a hub to tranship 1287 tonnes of freight to other destinations.

FIGURE 44 AIR FREIGHT EXPORTS TO THAILAND—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### Food Exports

Food exports to Thailand represented almost 40 per cent of the market in 1998, with food representing five of the top 15 commodity groups during 1996–1998. Food has increased in importance, increasing from 33 per cent of the market in 1996. However, food exports were affected by the Asian crisis, falling 32 per cent as a group in 1998.

Aside from *fresh fruit*, the other major food commodities were *fresh vegetables*, *meat*, *miscellaneous edible* and *crustaceans, molluscs*. The only food commodity group that suffered a decline in the volume of exports during 1998 was *fresh fruit*. All other food commodity groups recorded considerable, and in some cases, large increases, in the magnitude of exports during 1998 despite the decline in total export demand (with the exception of *meat* exports where there was no change in the level of exports in 1998).

Table 32 outlines in more detail changes in the level of exports to Thailand between 1996–98.

TABLE 32 MAJOR COMMODITIES EXPORTED BY AIR TO THAILAND—1996–1998

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Other	602.8	433.5	537.4	825.4	788.1	573.1	538.4	575.5	458.2	254.7	299.9	408.0
Miscellaneous edible	27.9	24.1	29.9	37.3	51.0	35.6	109.8	34.0	31.9	31.1	23.9	319.9
Other commodities	155.1	90.6	23.8	28.0	87.7	136.1	238.5	160.7	107.0	118.2	169.1	215.3
Fruit, fresh	676.8	327.6	9.5	175.2	1181	554.3	4.4	45.7	282.7	93.8	12.8	133.8
Meat	46.0	33.1	122.7	123.3	124.1	152.0	156.6	179.8	166.0	140.5	173.2	133.3
Vegetables, fresh	75.3	82.8	86.2	96.4	26.6	26.4	54.0	56.9	64.1	49.5	80.1	106.3
Misc. manufactured	36.6	39.6	37.3	68.2	75.1	103.3	95.2	97.5	24.8	33.9	33.5	55.1
General industrial	39.7	73.0	140.0	53.9	46.9	58.3	58.5	32.5	16.8	27.1	49.4	44.3
Medicinal	81.5	74.5	65.2	63.8	93.3	111.0	70.8	85.3	41.3	54.4	36.2	42.7
Manufactures of metal	27.9	143.9	46.9	35.7	58.4	44.0	39.5	26.9	37.7	29.4	23.7	37.0
Electrical	45.2	71.1	131.6	88.3	92.6	64.4	70.3	32.3	26.4	46.2	42.1	34.6
Crustaceans, molluscs	15.5	136.7	2.9	33.7	22.4	43.0	9.2	24.0	54.9	28.3	0.6	32.3
Essential oils	16.8	20.2	24.3	12.8	13.2	11.4	5.6	7.7	21.2	51.5	6.5	28.4
Road vehicles	28.4	34.5	34.3	35.2	28.0	22.8	64.9	36.7	20.2	43.0	17.6	14.6
Leather, etc	9.3	22.8	10.8	23.0	22.5	18.4	16.2	10.7	13.8	27.5	11.6	7.5
Telecommunications	28.1	17.3	21.8	7.4	5.6	27.6	64.4	31.4	12.4	32.9	12.1	4.5
Total	1 913	1 625	1 324	1 708	2 716	1 982	1 596	1 437	1 379	1 062	992	1 618

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity—1998***

### *Airlines, flights and cargo capacity*

During 1998, six airlines—Alitalia, British Airways, Olympic Airways, Polar Air Cargo, Thai International Airlines and Qantas—offered direct and indirect services connecting Australia and Thailand.

In total, there were 2634 flights available in 1998, of which 2592 flights (or 98 per cent) were passenger services, while the remaining 42 flights were dedicated freighters. The freighters made available approximately 1000 tonnes (or four per cent) of the 27 000 tonnes of total cargo capacity and represented approximately two per cent of the total number of flights.<sup>47</sup>

During 1998, the number of flights made available by the airlines varied across quarters. However, there was a substantial fall (25 per cent) in the number of flights offered—from 689 flights (first quarter) to 515 (fourth quarter). This reduction in flights caused corresponding falls in seats (18 per cent) and cargo capacity (12 per

<sup>47</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

cent). It is interesting to note that the number of flights increased in the second quarter to 715 despite the Asian crisis taking hold. The largest drop in flights occurred in the fourth quarter when Qantas (who were flying Boeing 767 aircraft) drastically reduced services. Polar Air Cargo also withdrew its services during the fourth quarter, removing dedicated freight capacity to Thailand.

Table 33 traces the changes in the number of flights and cargo capacity by aircraft type.

**TABLE 33 ESTIMATES OF CARGO SPACE AVAILABLE TO THAILAND—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	A300	39	39	39	39	156
	B747	481	546	546	446	2 019
	B747F	13	13	13	3	42
	B767	156	117	117	27	417
	Total	689	715	715	515	2 634
Seats	Passenger	240 000	258 000	258 000	197 000	953 000
Cargo capacity (t)	Passenger	6 300	7 000	7 000	5 700	26 000
	Freighter	300	300	300	100	1 000
	Total	6 600	7 300	7 300	5 800	27 000

*Note* Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

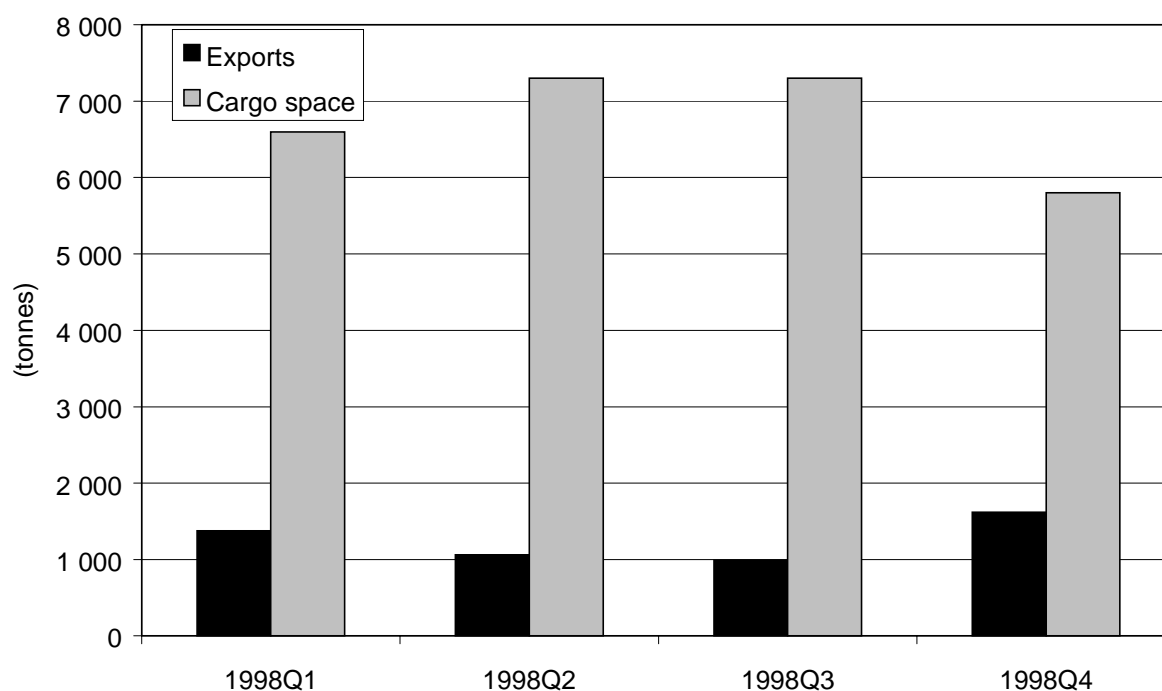
*Source* BTE estimates.

### *Alignment of supply and demand—1998*

A review of the cargo space supply and demand to the Thai market provides a first order assessment of whether any pressures exist on international air freight services. This review should identify possible problem areas within the air freight logistics chain to Thailand.

Figure 45 illustrates the quarterly cargo space supply and demand on flights to Thailand during 1998. It shows that less than 30 per cent of the available freight capacity was utilised during this time. Hence, it seems reasonable to conclude that in 1998, exporters who used these air services faced no constraints on the amount of cargo space they required.

FIGURE 45 AIR CARGO SPACE SUPPLY AND DEMAND TO THAILAND—1998



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### *Outlook for the air freight sector*

The multitude of variables required to definitely predict future air freight capacity supply and demand to Thailand puts the task beyond the scope of this study. Under certain assumptions about the Thai market however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this type of scenario analysis can then be used as a guide to future supply and demand under the conditions assumed. The following sections develop such a scenario.

#### *Thailand's economy and prospects for food exports*

Thailand's economy (population 61 million, GDP per head \$US 1 900)<sup>48</sup> has been severely affected by the Asian crisis, forcing it into recession in 1998 (negative eight per cent real GDP). The outlook for the Thai economy is for continued economic downturn, which will affect employment, investment and consumer demand. However, there are expectations of recovery during 1999. The International Monetary Fund (1999) forecast partial recovery in 1999 with real GDP growth of one per cent, followed by improved economic growth of three per cent during 2000.

In the short term, Supermarket to Asia (1998j) expect food imports to Thailand to be constrained as a result of depressed consumer demand and business confidence. Furthermore, the depreciation of the baht following its float made imported products more expensive compared to domestic products. Hence, demand for imported

<sup>48</sup> Supermarket to Asia (1999j), J.P. Morgan (1999).

products has fallen, and is expected to remain subdued in the short term. Expectations are for the resumption of strong growth in food imports once the economic obstacles have been overcome. However, Australian exports will continue to be constrained by existing trade barriers.

*Demand for air freight capacity*

As stated earlier, it is predicted that real GDP for the Thai economy will improve in 1999, recovering from the recession by recording economic growth of one per cent. Increasing confidence in the economy, combined with economic reforms, should see stronger growth in 2000. As a result, it is expected that exports from Australia will recover in 1999, with further growth in 2000.

Taking into account the forecast economic recovery, the food export opportunities identified by Supermarket to Asia, the last three years of Australian air freight exports to Thailand and making some assumptions about the market, the following scenario has been developed for exports to Thailand during 1999 and 2000.

The share of food items exported to Thailand has continued to rise over the last three years despite a fall in volume in 1998 and this is expected to continue over the next two years as the economy recovers. With the Thai economy expected to bounce back from recession in 1999, food exports from Australia should also recover. It is not, however, expected that food exports will recover to their pre-crisis levels, as income and employment levels will be considerably lower and trade barriers are likely to remain an impediment.

Hence it is assumed that food exports will increase by two per cent in 1999 followed by seven per cent in 2000. Table 34 shows little difference in the response of food and 'other' exports to the economic downturn in 1997-98. As a result, it is assumed that 'other' commodity groups, which made up 61 per cent of total air exports, will also recover with two per cent growth in 1999 and a further increase of seven per cent in 2000. The economic downturn affected the level of private investment through business bankruptcies and postponement of projects, hence future recovery in this sector is not expected to be fast.

The result of these assumptions on total demand for air cargo space is shown in table 34.

**TABLE 34 SCENARIO OUTLOOK FOR AIR FREIGHT TO THAILAND**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	5.5	-0.4	-8.0	1.0	3.0
Food (annual % change)		34	-32	2	7
Other (annual % change)		10	-36	2	7
Food (tonnes)	2 163	2 891	1 959	2 000	2 100
Other (tonnes)	4 407	4 840	3 092	3 200	3 400
Total (tonnes)	6 570	7 731	5 051	5 200	5 500

Sources International Monetary Fund (1999), BTE estimates.



*The passenger market and supply of flights*

The Australia–Thailand aviation market is served mainly by passenger aircraft. During 1998, approximately 98 per cent (2592 of the 2634) of flights used passenger aircraft, delivering 96 per cent of the air freight capacity. Given the strength of Australian travel to Thailand, it is reasonable to assume that this market profile will remain relatively constant in the short- to medium-term. It is therefore necessary to examine the passenger market in order to form a view on the future demand for freight services. Supply of passenger services is determined by passenger demand and government regulations. Currently there is adequate capacity in the bilateral air service agreement for airlines to start up additional services if warranted by demand. As of June 1998, approximately two-thirds of the Australian entitlement and half of the foreign entitlement were being utilised. None of the dedicated freight entitlement was being utilised by Australian or Thai airlines.

An eight-year time series of origin–destination (OD) and uplift–discharge (UD) traffic between Australia and Thailand illustrates the evolution of the passenger market in recent times (figure 46). Before the crisis (1991–1997), Thai visitors to Australia grew at an average annual rate of 18 per cent. However, the number of Thai’s visiting Australia has fallen considerably over the last two years (by 21 and 29 per cent respectively) suggesting that the depreciation of the baht had an immediate effect on their ability to travel. In contrast, Australians visiting Thailand grew at an average annual rate of 10 per cent for 1991–98 compared to only four per cent between 1991 and 1997.

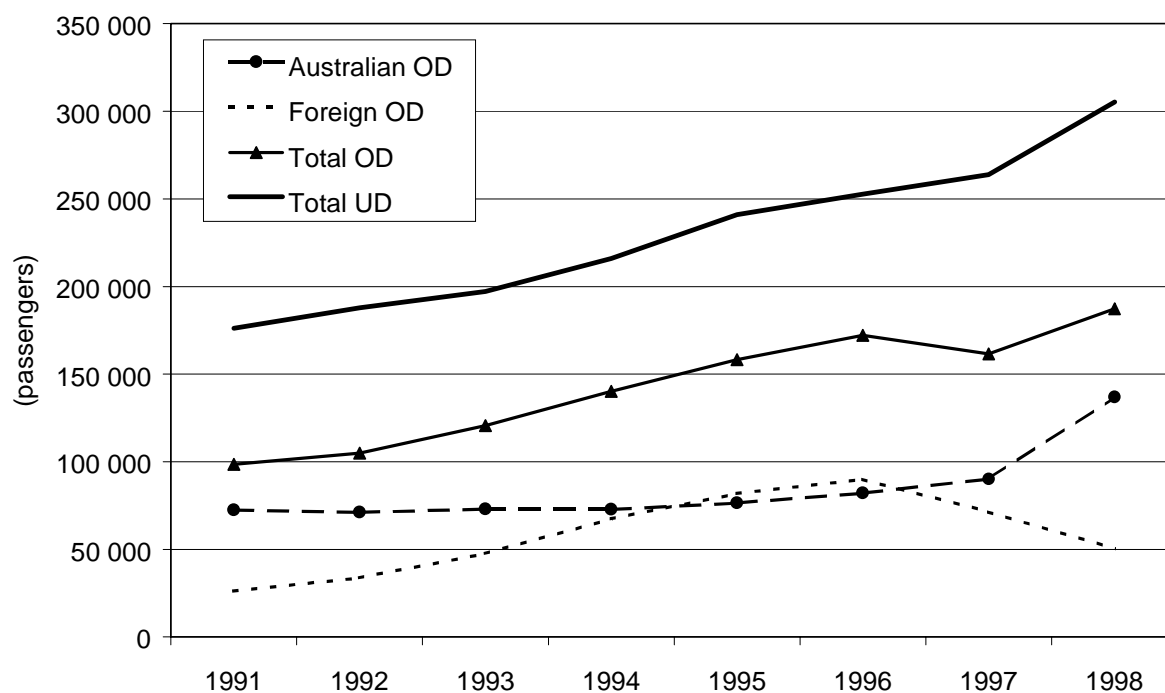
Australian OD traffic grew rapidly (by 52 per cent in 1998) in response to the favourable exchange rates. This was a substantial increase considering the flat growth prior to 1996. Until 1994–95 Australian OD traffic consistently exceeded foreign OD. At this time, however, a crossover occurred, with Thai arrivals in Australia exceeding Australians travelling to Thailand. This lasted until late 1996, when the Thai market began its fall. Since 1996, the Thai OD market has been in constant decline and the Australian OD market has experienced increasingly rapid growth. The strength of this Australian growth has translated through to total OD traffic despite the decline in foreign arrivals.

The consistent divergence between UD and OD passengers illustrates Thailand’s position as a regional hub for flights on to Europe and within Asia. UD passenger numbers have been increasing steadily over time (eight per cent average annual growth rate since 1991) and with the exception of 1996–97 have reflected trends in OD traffic. However, in 1996 UD and OD traffic moved in opposite directions with declines in OD whilst UD continued its rise. This was a result of the strength of the Australian market and the continued use of Bangkok as a regional hub maintaining increased demand for seats.

The Tourism Forecasting Council (1999) predicts average annual growth of 18.3 per cent for Thailand between 1991–2008. They forecast that foreign visitors would increase by 16 per cent in 1999 and 23 per cent in 2000. Australian OD passengers grew by ten per cent in 1997 and 52 per cent in 1998. The Australian market is expected to continue to expand during 1999 and 2000, but not to the same extent as

occurred in 1998. Combining the Tourism Forecasting Council predictions with expectations about the Australian market produces a scenario of increasing demand for seats in the OD market of ten per cent in 1999 and 12 per cent in 2000. However, this analysis does not give a proper indication of the growth of the Australia–Thailand market. To get a full picture it is necessary to examine UD traffic growth.

**FIGURE 46 AIR PASSENGERS MARKET—AUSTRALIA–THAILAND 1991–1998**



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

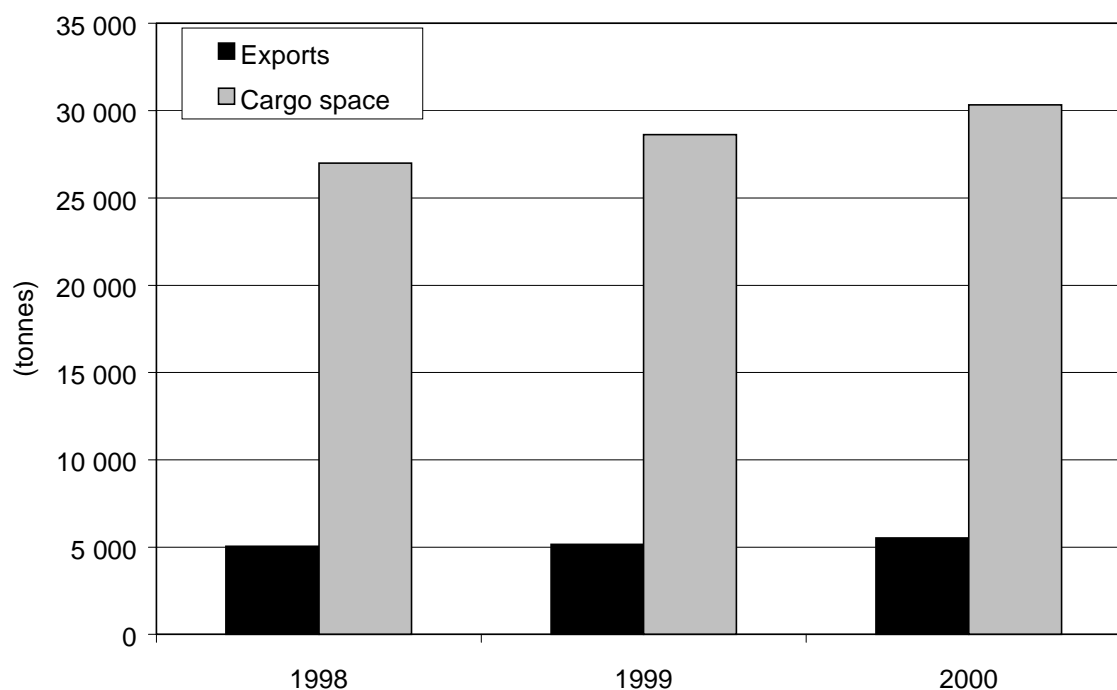
Thailand’s role as a regional hub is expected to continue and increase over the short- to medium-term. Therefore, the outlook for the number of flights in this market is linked to UD demand, which is assumed to be six per cent per annum, slightly below the annual average of seven per cent for 1991-97. These assumptions generate a net number of UD passengers in the Australia–Thailand market of 324 000 in 1999 (an increase of 18 300) and 343 000 in 2000 (a year-on-year increase of 19 400).

In translating seats to cargo capacity it has been assumed that the percentage of direct flights, the fleet composition and load factors all remain relatively unchanged. It is also assumed that the importance of Thailand as a regional hub will mean that airlines will respond to the increased demand by increasing the supply of seats. Taking all these assumptions into account, the change in cargo capacity is roughly equivalent to the increase in seat capacity. Thus, under this scenario, it is assumed that cargo capacity will increase by six per cent in both 1999 (to 28 600 tonnes) and 2000 (to 30 300 tonnes).

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998 (figure 47). Subject to the conditions assumed, it appears that exporters will not face any cargo capacity constraints in the short- to medium-term with utilisation rates below 20 per cent. Furthermore, there remains adequate supply of cargo capacity to match any sharp changes in demand. This finding reflects the dominant nature of Thailand's regional hub status in providing ample air freight capacity for exporters.

**FIGURE 47 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO THAILAND—1999–2000**

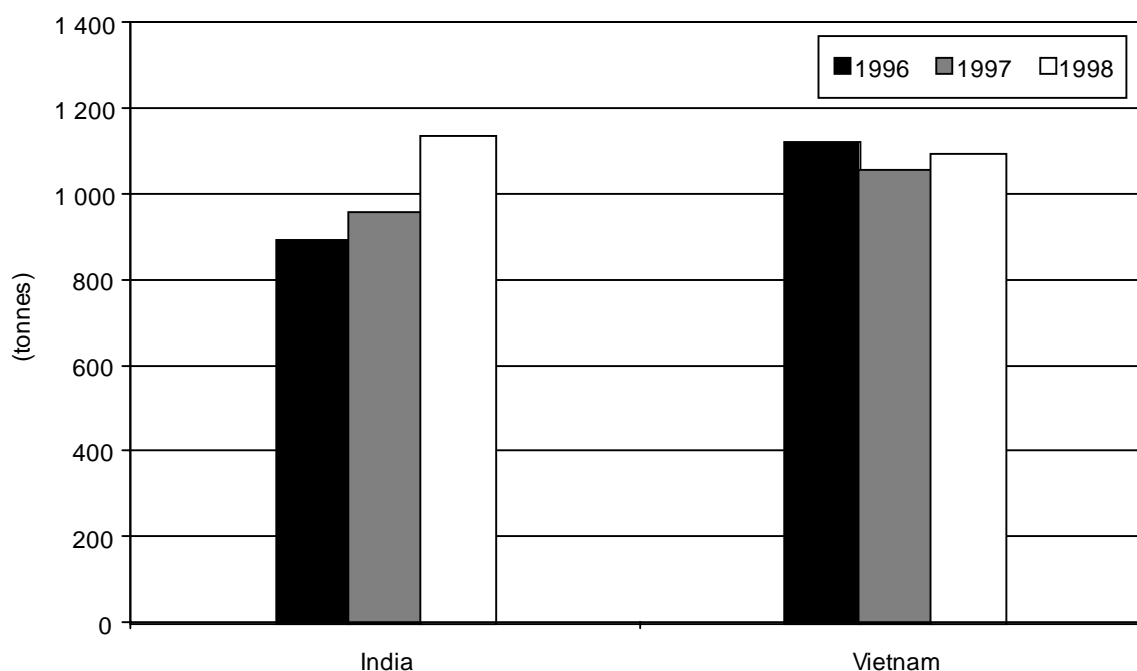


Source BTE analysis.

### **ANALYSIS OF THE 'SMALL' MARKETS**

In 1998, India and Vietnam between them received a little over one per cent of the air freight exports from Australia to the twelve Asian countries considered in this study. The two markets showed quite different historical profiles, with air freight to India continuing to grow strongly into 1998, while Vietnam remained subdued. Figure 48 shows the comparable size of these two markets (in terms of export volumes 'unloaded').

FIGURE 48 AIR FREIGHT EXPORTS TO THE 'SMALL' ASIAN MARKETS—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

## India

### *Exports (by air)—1996–1998*

India is one of the smallest Asian markets for Australian air exports. In 1998, 1136 tonnes of Australian commodities were exported by air to India.<sup>49</sup> This represents a 19 per cent increase on 1997 levels when 957 tonnes were exported. In 1997, Australian exports to India rose by seven per cent. The Asian crisis therefore appears to have had no impact on India's demand for Australian exports.

### *Major export groups*

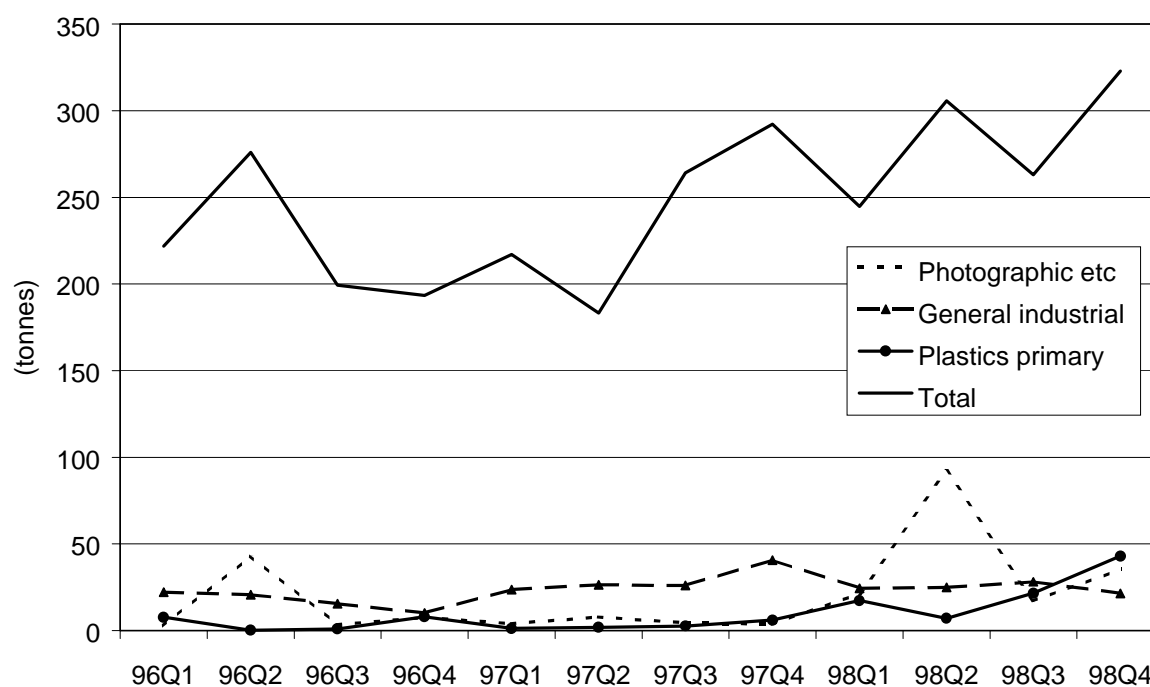
Australia's commodity export mix and volume to India over the last three years have varied considerably. As a result, distinguishing the top commodities for the whole 1996–98 period is not possible. Looking only at 1998, and excluding *other* categories, *photographic equipment* was the top commodity with 15 per cent of the market, followed by *general industrial* with nine per cent and *plastics primary* with eight per cent. Together, these three commodities constituted 31 per cent of the market in 1998. *Photographic* exports have rapidly increased their share of the market, recording a phenomenal 731 per cent growth rate in 1998 after a 65 per cent decline in 1997. This

<sup>49</sup> 1136 tonnes of air freight were flown from Australia and 'unloaded' in India in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, 1279 tonnes were recorded by freight forwarders/exporters as 'destined' for India. In other words, 143 tonnes (or 11 per cent) went to India via other countries (on indirect flight routings).

exceptional growth is a result of steep spikes in the data in the second quarters of 1996 and 1998. The demand for *general industrial* grew substantially (71 per cent) in 1997, but fell by 15 per cent in 1998. The share of *plastics primary* was relatively insignificant in both 1996 and 1997; however, an increase in 1998, including an unusual spike in the last quarter of 1998 (following a 30 per cent decline in 1997) meant that *plastics primary* experienced a growth rate of 648 per cent in 1998.

The interpretation of these commodity-specific findings is made difficult by the large data spikes, the small volumes/low bases and the fact that the large increases are partly due to significant declines in 1997. The reason for the declines in 1997 is not explored. The volatility of this developing market for Australian exports means that these results should be interpreted with caution. Figure 49 illustrates a three-year quarterly history of these major commodity groups.

FIGURE 49 AIR FREIGHT EXPORTS TO INDIA—1996–1998



Source BTE analysis of ABS International Commodity Statistics (unpublished).

### Food exports

There were no food categories in the top 15 commodities exported to India in 1998. However, the data does reveal that total food commodity groups made up seven per cent of the market in 1998. The main food groups exported to India were *meat* (three per cent of the total market), *beverages*, *dairy products*, *miscellaneous edible products* and *cereal preparations*.

Table 35 provides more detail of the quantities of various commodity groups exported to India over 1996–98.

TABLE 35 MAJOR COMMODITIES EXPORTED BY AIR TO INDIA—1996–1998

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Plastics primary	7.8	0.2	1.0	8.0	1.3	1.9	2.6	6.1	17.3	7.1	21.6	43.0
Photographic etc	2.7	43.2	3.3	7.6	4.0	7.9	4.4	3.7	21.5	92.1	17.1	35.4
Crude animal & vegetable	0.0	1.0	0.6	0.0	0.4	0.0	1.6	11.7	24.5	9.1	0.2	24.9
General industrial	22.1	20.8	15.5	10.2	23.8	26.5	26.0	40.7	24.4	24.9	28.2	21.5
Other commodities	7.2	6.7	10.5	25.4	29.5	3.4	20.3	23.4	39.5	29.2	13.2	19.3
Misc manufactured	60.4	5.4	24.7	9.0	16.3	17.2	24.2	24.6	21.0	21.2	16.8	15.5
Machinery specialised	3.7	38.6	38.2	7.9	4.0	4.1	15.2	41.2	6.4	13.7	5.7	13.3
Leather etc	9.9	12.2	13.4	22.7	7.9	17.1	20.9	12.3	8.6	26.4	11.1	13.1
Office machines/ADP	6.6	4.7	5.3	3.7	10.4	10.9	11.7	12.7	7.9	6.4	7.3	13.1
Electrical	5.1	8.3	8.4	6.1	10.8	10.1	4.9	15.5	13.4	6.8	5.3	9.5
Manufactures of metal	27.1	4.2	9.4	4.4	13.4	6.0	15.1	8.3	6.0	13.0	10.2	7.5
Professional & scientific	2.0	3.8	3.3	3.7	3.9	4.9	2.6	5.7	3.8	8.3	6.2	6.7
Road vehicles	8.9	5.8	6.5	4.0	1.4	3.4	4.9	1.3	11.5	13.0	14.6	1.8
Power machinery etc	2.2	6.7	6.9	1.5	2.1	9.1	2.7	5.6	3.8	3.7	0.7	1.8
Paper, paperboard etc	0.4	3.8	4.1	1.6	1.3	0.6	4.6	1.2	0.0	4.0	2.4	1.2
Other	56.0	110.6	48.4	77.7	86.6	60.0	102.4	78.3	34.9	23.4	103.1	95.9
Total	221.8	275.9	199.4	193.5	217.1	183.2	264.1	292.2	244.7	305.7	263.0	323.0

Note Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

Source BTE analysis of ABS International Cargo Statistics (unpublished).

## ***Air cargo capacity — 1998***

### *Airlines, flights and cargo capacity*

Only one airline (Qantas) flew from Australia to India in 1998. There were no direct flights to India available; all flights were via Singapore to Bombay. For the first quarter, Sydney was the only port of exit for commodities to Bombay, but Qantas increased the number of flights (from four to seven flights per week over 1998) and expanded services from Melbourne and Brisbane as the year progressed.

In total, there were 308 flights available in 1998, all of which used passenger aircraft. These flights translated into 70 500 seats offered to the Australia–India market and belly-hold cargo capacity of 1800 tonnes for the year. During the course of 1998, the number of flights from Australia to India increased considerably—from 52 in the first quarter to 91 in the fourth quarter (a 75 per cent increase). As the same airline and aircraft type were used to expand services, the number of seats and cargo capacity also experienced equivalent increases over 1998<sup>50</sup>. The bulk of this increase occurred in the second quarter of 1998 with a 50 per cent rise in flights.

<sup>50</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this

Table 36 summarises the quarterly breakdown of flights and cargo capacity by aircraft type.

**TABLE 36 ESTIMATES OF CARGO SPACE AVAILABLE TO INDIA—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	B767	52	78	87	91	308
	Total	52	78	87	91	308
Seats	Passenger	12 000	18 000	20 000	20 500	70 500
Cargo capacity (t)	Passenger	300	450	500	550	1 800
	Freighter	0	0	0	0	0
	Total	300	450	500	550	1 800

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

### *Alignment of supply and demand—1998*

Comparing the demand for cargo space (the quantity of commodities exported by air to India) with the amount of export cargo space airlines made available in 1998 provides a first-order assessment of the existence or extent of any demand pressures being experienced by the air freight link of the logistics chain between Australia and India.

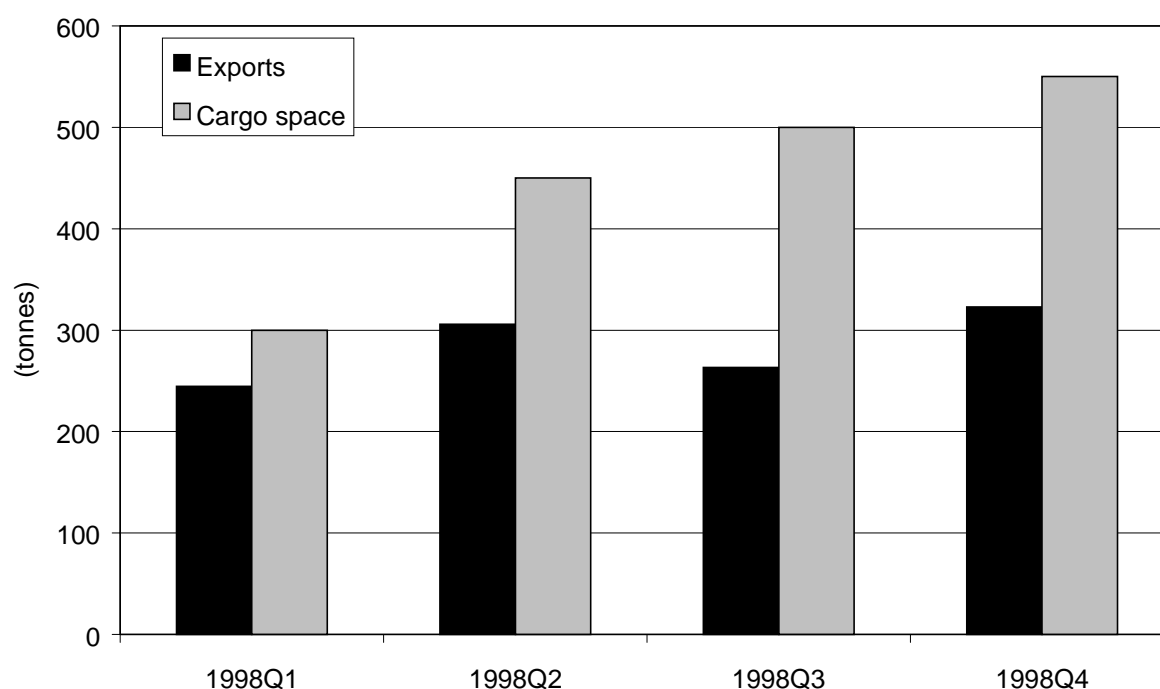
Figure 50 shows the quarterly air freight supply and demand to India in 1998. Capacity utilisation rates are below critical levels averaging 65 per cent for the year.<sup>51</sup> Utilisation in the first quarter was much higher but did not reach a level where significant pressure on the market appeared to exist. Figure 50 shows no sign of any capacity constraint in the Australia–India market.

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minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

<sup>51</sup> The work of Douglas and Miller (1974) was drawn on in interpreting at what level of cargo capacity utilisation an air freight network is approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to encounter capacity constraints in the overall network. As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.

FIGURE 50 AIR CARGO SPACE SUPPLY AND DEMAND TO INDIA—1998



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### *Outlook for the air freight sector*

The multitude of variables required to definitely predict future air freight capacity supply and demand to India puts the task beyond the scope of this study. Making certain assumptions about the Indian market, however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this type of scenario analysis can then be used as a guide to future supply and demand under the conditions assumed. The following sections develop such a scenario.

#### *India's economy and prospects for food exports*

The outlook for the Indian economy (population 947 million and GDP per capita \$US 800 in 1998)<sup>52</sup> is relatively positive—economic growth will remain strong but will continue to slow from the above seven per cent levels experienced pre-1997. The slowing in growth is not likely to be solely a result of the financial crisis; other internal forces are thought to be driving the market. According to the International Monetary Fund (1999), the outlook for India in terms of real GDP growth is 5.6 per cent in 1998, 5.2 per cent in 1999 and 5.1 per cent in 2000. Growth rates for India were 5.5 per cent in 1996 and 7.4 per cent in 1997.

India is a growing market for Australian exports. It is the world's fifth largest economy and the most populous democracy in the world. Fundamental economic reforms (for example, reduced protection and greater trade liberalisation) over the

<sup>52</sup> Supermarket to Asia (1999k), J.P. Morgan (1999).



last six years have enabled India to increase trade and investment with the rest of the world. The recent slowing in growth is attributed to sharp reductions in agricultural productivity and a deceleration in the growth of industry in addition to the Asian crisis.

Over the short term, Supermarket to Asia (1998k) predict that trade to India will continue to expand as the market further opens up. Over the medium- to longer-term Supermarket to Asia (1998k) anticipates that India will increase its importance as a destination for Australian exports. In particular, the food market is said to be ready for further diversification and growth. Factors expected to contribute to this growth include India's large population, the expected implementation of ASEAN tariff levels and the expected elimination of all quantitative import restrictions over the next few years.

#### *Demand for air freight capacity*

As there were no major food items in the top 15 commodity groups exported to India, it is not possible to split the demand for air freight capacity into the food and 'other' categories used in analysing other markets. As previously mentioned, Australia did export some food items to India, but the quantities, their proportion and the fact that India is a growing market meant that attempting to take the analysis any further was not appropriate for this study.

Consequently, the scenario focuses on total air freight to India. As already discussed, Australian exports to India have enjoyed considerable but slowing growth over the last few years (19 per cent in 1998 and seven per cent in 1997). This, plus the continued strong but slowing growth outlook for the Indian economy, in addition to Supermarket to Asia's positive outlook suggests continued strong growth in exports to India, but at a slightly slower rate of 15 per cent in both 1999 and 2000. Table 37 summarises the historical and projected scenario data for India.

**TABLE 37 SCENARIO OUTLOOK FOR AIR FREIGHT TO INDIA**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	7.4	5.5	5.6	5.2	5.1
Total Exports (annual % change)		7	19	15	15
Total Exports(tonnes)	891	957	1 136	1 300	1 500

Sources: International Monetary Fund (1999), BTE estimates.

#### *The passenger market and supply of flights*

The Australia-India aviation market was served solely by passenger aircraft in 1998. It is unlikely this will change in the foreseeable future. To construct plausible scenarios for the future supply of freight capacity it is therefore necessary to do the same for the future supply of passenger services.

The supply of passenger aircraft is determined by passenger demand and government regulations in the market, not the demand for freight capacity. There are

no government limits on the growth of freight services—the Australia–India bilateral air service agreement currently has significant unutilised capacity in the passenger market. No dedicated freight capacity has been negotiated in the agreement, most likely because it is not seen to be needed for the foreseeable future. The evolution of the Australia–India passenger market is shown in figure 51, which displays an eight-year time series of origin–destination (OD) and uplift–discharge (UD) traffic between the countries.

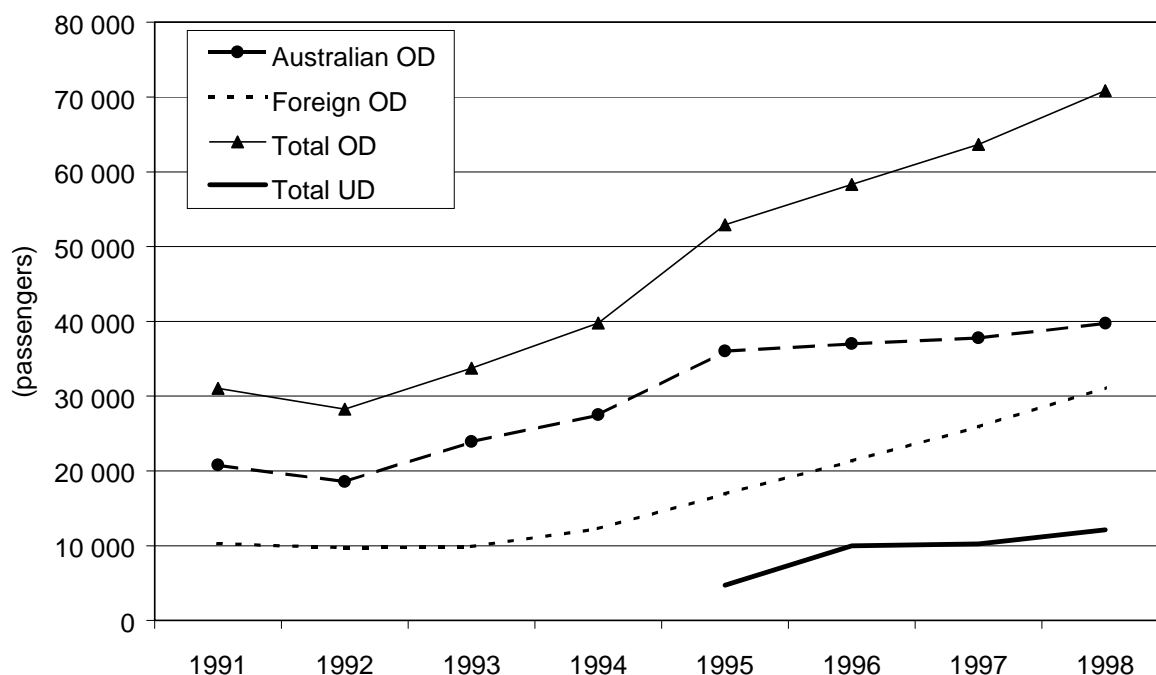
Indian visitors to Australia grew at an average annual rate of 17 per cent between 1991 and 1998, while Australians visiting India grew at a rate of ten per cent. It was in 1994–95 that traffic between the two countries began to take off. The number of Australian visitors to India has consistently exceeded the number of Indians visiting Australia over the last eight years. However, this trend appears to be changing. Figure 51 shows foreign OD traffic increasing rapidly and Australian OD growing at much slower rates, indicating a crossover will occur sometime beyond 2000.

The total number of Indian visitors to Australia continued to increase in 1998 with a 20 per cent rate of growth (down only slightly on the 21 per cent in 1997). Any side effects from the slowdown in GDP growth appear to have had little impact on Indians' demand for travel to Australia. Australians visiting India continued to grow by five per cent in 1998, an improvement from the two per cent growth in 1997. UD data was only available from 1995 onwards. For that period, both OD and UD data reflect the general upward trend present in the Australia–India aviation market. Total OD traffic increased by 11 per cent in 1998 and UD traffic rose by 18 per cent. The large divergence between OD and UD traffic indicates the indirect nature of flights available to India. The majority of traffic to India is going via an intermediate stop and hence does not show up in UD data. The UD traffic that does appear is still indirect (Qantas via Singapore) but appears because the same flight number is likely to be used throughout the route.

Visitor arrival growth rate forecasts from the Tourism Forecasting Council (1999) were not available specifically for India as it was included in a 'remaining other Asia' category. The average annual growth rate forecast for this category over the next ten years is 11.6 per cent. Arrivals from 'other Asia' grew by 16 per cent in 1997 and seven per cent in 1998. The Tourism Forecasting Council predicts an eight per cent increase in 1999 and 12 per cent growth in 2000 (Tourism Forecasting Council, 1999).

The growth in foreign OD traffic for India well exceeded that of the 'remaining other Asia' category in the Tourism Forecasting Council foreign arrival data for both 1997 and 1998. As a result of this, the historical passenger data and the general economic outlook for India, it is assumed that Indian visitors to Australia will continue to increase by 17 per cent per annum for both 1999 and 2000. It is also assumed that the number of Australians visiting India will grow at eight per cent per annum in both 1999 and 2000, somewhat below the average annual rate of ten per cent for 1991–98. This reflects the higher weighting given to the more recent years in which growth rates have been well under ten per cent.

FIGURE 51 AUSTRALIA-INDIA AIR PASSENGER MARKET—1991-1998



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

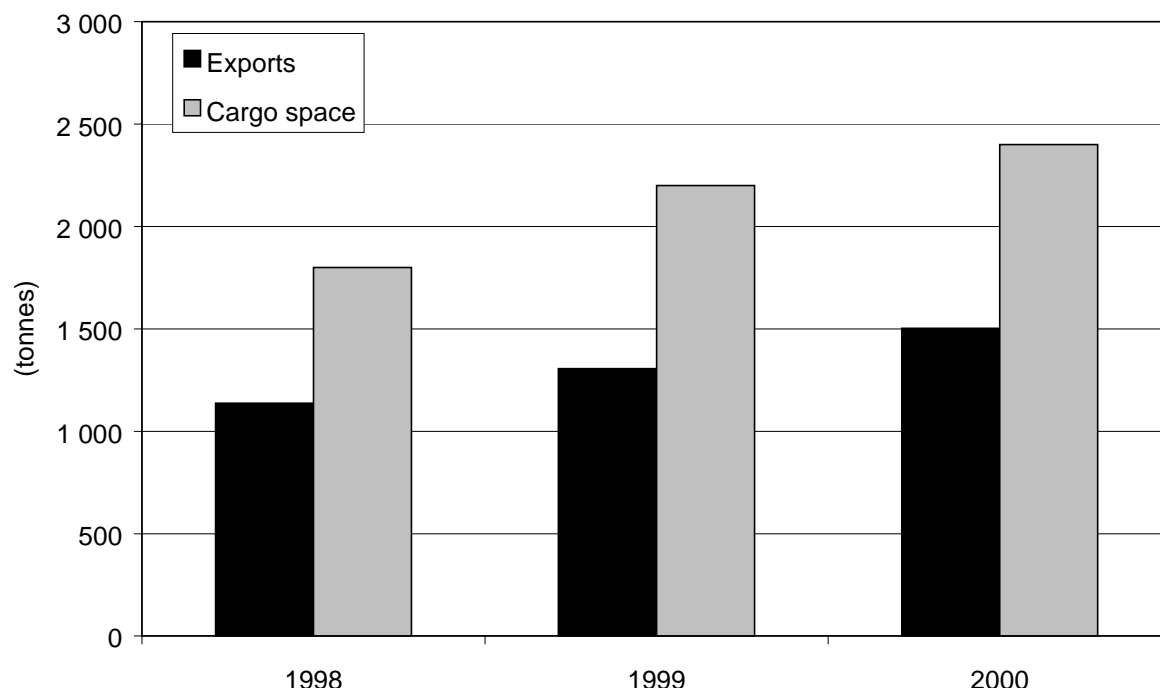
Assuming relatively constant load factors and aircraft, these assumptions lead to a total scenario of increasing demand for seats in the market in both 1999 and 2000 of approximately 12 per cent per annum. This growth is assumed to be driven largely by the Indian demand for seats to Australia. A closer look at the Australia-India OD market reveals that passenger demand for seats have historically been highly seasonal, with large peaks in the fourth quarter of each year. Airlines have responded to this highly seasonal market by supplying capacity to match (increasing flights from four to seven per week over 1998).

As a result of this seasonality, a drop in flights and capacity might be expected in the first quarter of 1999. This was not the case, however, as the 1999 air service agreement reveals that seven flights per week are maintained throughout. Taking this into account, and assuming a 12 per cent increase in demand, airlines are assumed to respond by maintaining seven flights a week in 1999 (an 18 per cent increase on 1998) increasing to eight flights a week in 2000 (a 14 per cent increase on 1999). Given the historical data, it is reasonable to assume that the airline will make little or no change to aircraft or routes serving the market. Therefore, this will translate into a 22 per cent rise in cargo space in 1999 and nine per cent increase in 2000. The cargo scenario therefore is that capacity rises to approximately 2200 tonnes in 1999 and 2400 tonnes in 2000.

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998. Figure 52 illustrates the scenario outlook. After allowing for the assumptions made, Australian exports to India are unlikely to face any air freight capacity constraints in the short- to medium-term with utilisation rates remaining below 65 per cent.

**FIGURE 8 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO INDIA—1999–2000**



Source BTE analysis.

**Vietnam**

***Exports (by air)—1996–1998***

Vietnam is one of Australia’s smallest markets in terms of air freight exports—receiving only 1094 tonnes in 1998.<sup>53</sup> This was marginally up (four per cent) from the previous year when Vietnam imported 1054 tonnes of commodities. This small change reflects subdued economic conditions within Vietnam and the wider Asian community.

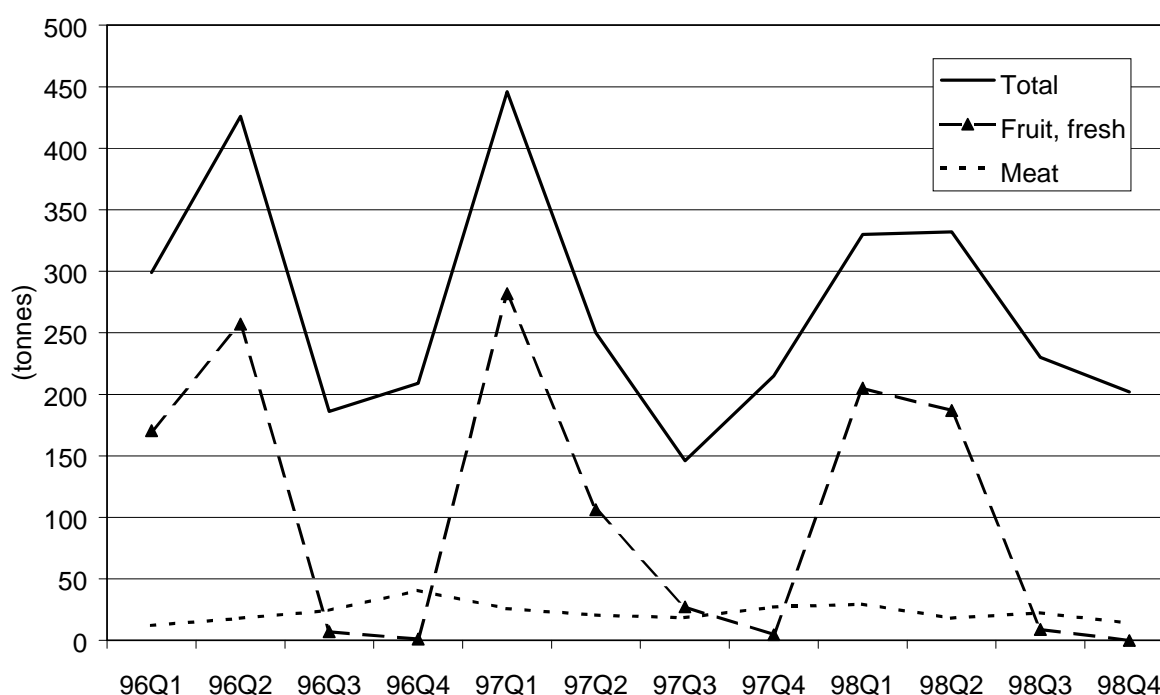
<sup>53</sup> 1094 tonnes of air freight were flown from Australia and ‘unloaded’ in Vietnam in 1998. This quantity represented the demand for air freight capacity between the two countries—the focus of this study. However, 1169 tonnes were recorded by freight forwarders/exporters as ‘destined’ for Vietnam. In other words, 75 tonnes went to Vietnam via other countries (on indirect flight routings).

### Major export groups

The major commodity group exported to Vietnam over the last three years has been *fresh fruit*. This commodity group is the driving force behind the total market for Vietnam. In 1998, *fresh fruit* represented 37 per cent (401 tonnes) of the total Vietnamese market. Its share of the market has remained relatively constant ranging between 39 per cent in 1996 to its present level of 37 per cent. A closer examination of figure 53 illustrates the strength of *fresh fruit* to the total commodities exported to Vietnam. Over this period, the *fresh fruit* commodity group has experienced a large degree of variation due to seasonal factors, which in turn has affected total exports.

The next largest air freight export over the three years was *meat*, comprising approximately nine per cent of the market. Unlike *fresh fruit*, *meat* exports have remained relatively constant over the past three years, experiencing only small variations in the quantity of exports during each of the quarters. However, the total volume of *meat* exports has been declining for the past two years, falling nine per cent during 1998. Figure 53 illustrates a three-year quarterly history of the major export groups.

FIGURE 53 AIR FREIGHT EXPORTS TO VIETNAM—1996–1998



Source BTE analysis of ABS International Cargo Statistics (unpublished).

### Food Exports

The Vietnamese market is dominated by food (45 per cent in 1998), despite food items only making up three of the top 15 commodity groups during the period.

Apart from *fresh fruit* and *meat* mentioned above, the other major food commodity that Australia exported to Vietnam was *beverages*. All of these food items experienced a fall in the level of exports over the period, with beverages experiencing the largest decline of 56 per cent in 1998 following a fall of 22 per cent in 1997. The falls in food export groups to Vietnam are not solely due to the Asian crisis. Other factors are thought to be driving the market since these commodity groups also experienced minor falls during 1997. Vietnam enjoyed strong economic growth during 1998 (although down on 1997 levels). Table 38 outlines in more detail changes in the level of exports to Vietnam between 1996–1998.

**TABLE 38 MAJOR COMMODITIES EXPORTED BY AIR TO VIETNAM—1996–1998**

	1996 Q1	1996 Q2	1996 Q3	1996 Q4	1997 Q1	1997 Q2	1997 Q3	1997 Q4	1998 Q1	1998 Q2	1998 Q3	1998 Q4
	(tonnes)											
Other commodities	5.1	3.6	8.1	23.7	7.5	4.3	5.7	27.3	18.9	19.1	18.5	45.0
Other	53.4	63.7	53	58.2	69.6	45.2	43	51.1	28.1	20.7	51.0	38.8
Medicinal	10.5	17.3	18	16.5	11.5	8.3	11.9	32.9	7.8	7.3	18.8	32.7
Machinery specialised	3.7	3.1	1.5	3.6	7.0	1.7	1.2	11.0	3.0	4.6	16.8	19.2
Meat	12.2	18.0	24.4	40.6	25.9	20.6	18.5	27.2	29.6	18.1	22.5	14.0
Electrical	9.4	7.9	14.7	12.7	7.8	18.7	14.3	18.6	6.7	10.8	15.1	12.6
Textiles	5.3	7.0	14.4	4.2	2.4	4.9	3.6	13.8	3.0	8.0	14.7	12.3
Articles of apparel	0.4	1.5	0.9	1.1	1.4	1.6	0.7	5.5	14.7	6.6	4.1	10.1
General industrial	4.8	5.8	12.6	5.3	4.6	4.3	6.3	7.7	4.6	5.5	7.3	7.0
Telecommunications	8.5	6.1	5.3	3.4	2.8	1.5	1.3	0.2	2.6	8.7	6.7	5.9
Manufactures of metal	4.3	3.2	10.6	16.1	3.2	10.3	5.3	5.9	2.8	4.1	2.7	3.1
Beverages	4.7	4.5	2.3	4.6	0.0	8.8	0.4	3.4	0.0	5.0	0.0	0.6
Non-ferrous metals	1.6	2.5	0.6	2.0	8.3	9.4	1.8	0.5	0.2	17.4	40.4	0.4
Leather etc	2.2	0.9	1.4	0.4	2.8	2.3	0.9	0.2	1.2	5.6	1.4	0.4
Fruit, fresh	170.4	257.3	7.0	1.2	281.9	106.2	27.4	4.7	205.2	186.8	9.0	0.0
Non-metallic mineral	2.4	23.9	11.1	15.1	9.3	2.3	4.2	4.8	1.3	3.9	1.3	0.0
Total	299	426	186	209	446	250	146	215	330	332	230	202

*Note* Data in this table refer to quantities of freight 'unloaded'. Due to some transshipment of goods at hub airports, there may be a small difference between these numbers and the quantities of freight actually 'destined' for this country. The differences, except for significant hubs like Singapore, are not usually more than a few per cent.

*Source* BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Air cargo capacity—1998***

#### ***Airlines, flights and cargo capacity***

During 1998, the Vietnamese market was served by two airlines through direct services—Qantas and Vietnam Airlines. However, during the latter part of the fourth quarter Qantas withdrew from serving the market directly by undertaking a code sharing agreement with Vietnam Airlines.

During the year, there were 188 flights between Australia and Vietnam, all of which were passenger services. The belly-hold freight capacity made available on these services totalled 1750 tonnes.<sup>54</sup>

During 1998, the number of flights made available by the airlines remained relatively constant across quarters, with the exception of the fourth quarter. The number of flights in the first quarter (52 flights) and the corresponding freight capacity (around 500 tonnes) fell to 32 flights and 250 tonnes of freight capacity in the fourth quarter when Qantas began a code sharing agreement with Vietnam Airlines. It is interesting to note that the aircraft mix remained unchanged for Vietnam during 1998.

Table 39 traces changes in the number of flights and cargo capacity by aircraft type.

**TABLE 39 ESTIMATES OF CARGO SPACE AVAILABLE TO VIETNAM—1998**

		1998Q1	1998Q2	1998Q3	1998Q4	Whole year
Flights	B767	52	52	52	32	188
	Total	52	52	52	32	188
Seats	Passenger	12 400	12 400	12 400	7 800	45 000
Cargo capacity (t)	Passenger	500	500	500	250	1 750
	Freighter	0	0	0	0	0
	Total	500	500	500	250	1 750

Note Figures in this table are estimates derived from airline timetables and Aerocost 2 simulations and do not necessarily reflect actual capacity offered.

Source BTE estimates.

### *Alignment of supply and demand—1998*

A review of the cargo space supply and demand to Vietnam provides a first order assessment of any pressures on international air freight services. This should identify any problem areas within the air freight logistics chain to Vietnam.

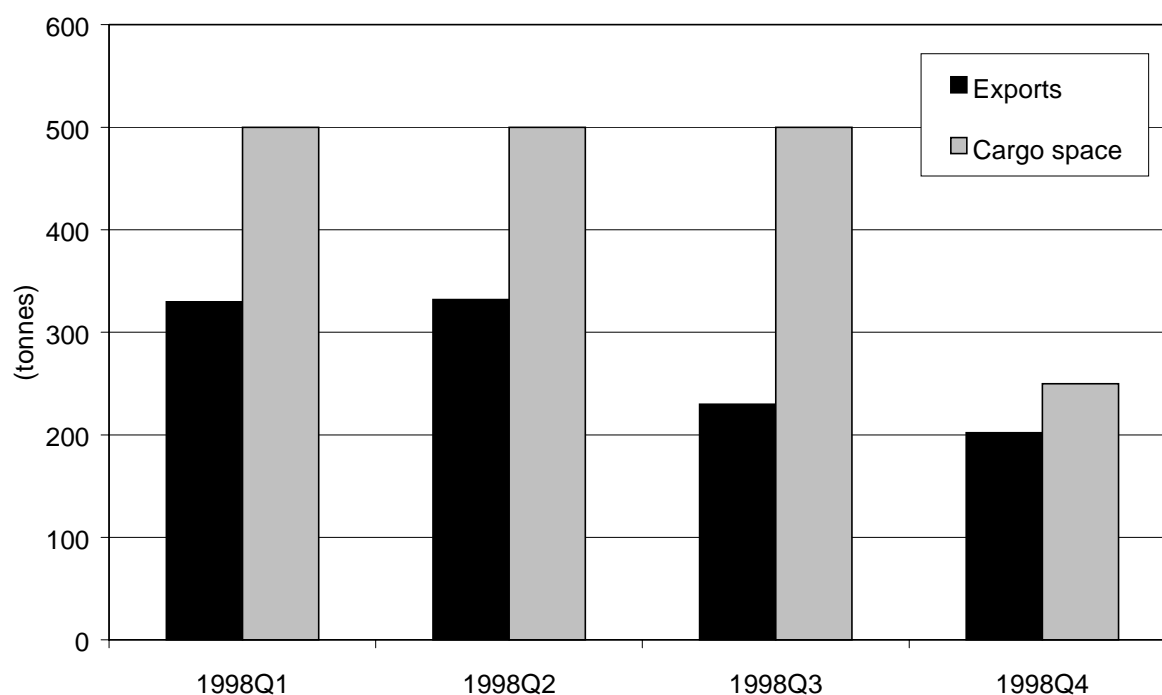
Figure 54 illustrates the quarterly cargo space supply and demand on passenger flights to Vietnam during 1998. It is apparent that the demand for cargo space to Vietnam has been met by the current supply of passenger services; however, some pressure appears to exist in the fourth quarter with approximately 81 per cent of the cargo capacity being utilised by exporters.<sup>55</sup> This was a result of Qantas withdrawing

<sup>54</sup> As explained in the section on analytical approach, cargo hold capacities are estimates of space that should always be available to exporters, as they are based on 100 per cent passenger load assumptions and adjusted for actual trip-based fuel requirements. It is possible that more than this minimum guaranteed quantity is available on particular flights that depart with low passenger loadings.

<sup>55</sup> The work of Douglas and Miller (1974) was drawn on in interpreting whether or not an 81 per cent overall cargo capacity utilisation represents an air freight network approaching congestion. In analysing US aviation markets, Douglas and Miller developed a model for assessing the probability of delay within an airline flight system (see appendix V for a fuller explanation). The schedule delay model of Douglas and Miller suggests that, as cargo hold utilisation levels approach 80 to 85 per cent, it is reasonable to infer that freight forwarders are beginning to

services. Some exporters may have faced some problems in obtaining guaranteed cargo space on scheduled services in the fourth quarter. That is, as load factors increase, the chance of exporters obtaining cargo space on their desired flight diminishes. With the exception of the fourth quarter, exporters were utilising less than 70 per cent of cargo capacity indicating that there was ample capacity available. However, due to the reduction of services, any sizeable movement in the demand for cargo space without a similar increase in capacity may involve the market coming under greater pressure with some capacity constraints arising.

**FIGURE 54 AIR CARGO SPACE SUPPLY AND DEMAND TO VIETNAM—1998**



Source: BTE analysis of ABS International Cargo Statistics (unpublished).

### ***Outlook for the air freight sector***

The multitude of variables required to definitely predict future air freight capacity supply and demand to Vietnam puts the task beyond the scope of this study. Making certain assumptions about the Vietnamese market, however, it is possible to construct a reasonable scenario of air freight supply and demand. The results of this type of scenario analysis can then be used as a guide to future supply and demand under the conditions assumed.

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encounter capacity constraints in the overall network. As utilisation levels go beyond 90 per cent, there is little doubt that the air freight system in total is becoming congested.



*Vietnam's economy and prospects for food exports*

The outlook for the Vietnamese economy (population 75 million, GDP per head \$US 285)<sup>56</sup> is for a decline in economic growth due to a slowing of exports to Asia and a fall in foreign investment. According to the International Monetary Fund (1999), the outlook for Vietnam in terms of real GDP growth is 3.5 per cent in 1998, 3.5 per cent in 1999 and 4.5 per cent in 2000. Although the Vietnamese market has been affected by the Asian crisis, the effect on the economy has been relatively small in comparison to other Asian countries. Pre-crisis growth rates were above eight per cent.

Over the short term, food imports to the Vietnamese market are expected to fall due to a reduction in the level of income. Supermarket to Asia (1998l) predict food imports to remain subdued for the next two years. However, the medium-term assessment remains more favourable, as Vietnam removes trade barriers in its attempts to join APEC and the World Trade Organisation. Changing food consumption habits should also result in increased exports. Supermarket to Asia (1998l) envisage Vietnam to grow in importance as a destination for Australian food and beverages in the future, as the country reforms its trading and financial environment and the emerging middle class creates a market for imports. However, Vietnam's complex regulations and distribution systems may make imports difficult in the short term.

*Demand for air freight capacity*

As stated above, it is forecast that real GDP for the Vietnamese economy will grow at 3.5 per cent in 1999, unchanged from 1998, and 4.5 per cent in 2000. With strong economic growth forecast over the next two years and the medium-term outlook remaining strong for food exports, Vietnam's export profile is expected to remain relatively strong.

In 1998, food items represented 45 per cent of total exports to Vietnam, down from 50 per cent in 1997 and 49 per cent in 1996. Clearly, the food sector represents an important set of commodities in determining a view on the future demand for air freight capacity. Food items exported to Vietnam have fallen over the last three years. Between 1996–1997 food items fell by four per cent, followed by a seven per cent decline in 1998. Considering the level of economic growth forecast for Vietnam through to 2000, it is difficult to ascertain how Australia's food exports will be affected. Supermarket to Asia (1998l) assume Vietnam's food imports will remain subdued in the short term and that complex import regulations make it difficult to foresee substantial changes in the level of imports. However, Vietnam is expected to begin freeing up its domestic market in a bid to join the World Trade Organisation.

Taking all this into account, food exports to Vietnam are assumed to fall by seven per cent in 1999 and a further two per cent in 2000 as economic growth strengthens. The justification for the declines is that food exports fell by four per cent in 1997, even though economic growth remained strong at 8.8 per cent. These are conservative

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<sup>56</sup> Supermarket to Asia (1999l).

forecasts that take into account the growth of Australian exports over the past three years.

'Other' commodity groups made up 55 per cent of air exports to Vietnam and have remained relatively constant over the three-year period. Consolidated growth is expected in this area due to Vietnam implementing infrastructure development projects, such as telecommunication facilities and irrigation systems, which will help improve quality of service and productivity. In 1998, 'other' commodity groups increased by 13 per cent, though real GDP growth fell from 8.8 per cent to 3.5 per cent. Hence, a further increase of 13 per cent is expected in 1999 and in 2000 (due to real GDP remaining relatively constant over the corresponding period) as the Vietnamese government continues to implement these developmental projects. The result of these assumptions on total demand for air cargo space is shown in table 40.

**TABLE 40 SCENARIO OUTLOOK FOR AIR FREIGHT TO VIETNAM**

	1996	1997	1998	1999 (scenario)	2000 (scenario)
Real GDP (annual % change)	9.3	8.8	3.5	3.5	4.5
Food (annual % change)		-4	-7	-7	-2
Other (annual % change)		-7	13	13	13
Food (tonnes)	547	525	491	450	450
Other (tonnes)	573	533	604	700	800
Total (tonnes)	1 120	1 058	1 094	1 150	1 200

Sources: International Monetary Fund (1999), BTE estimates.

### *The passenger market and supply of flights*

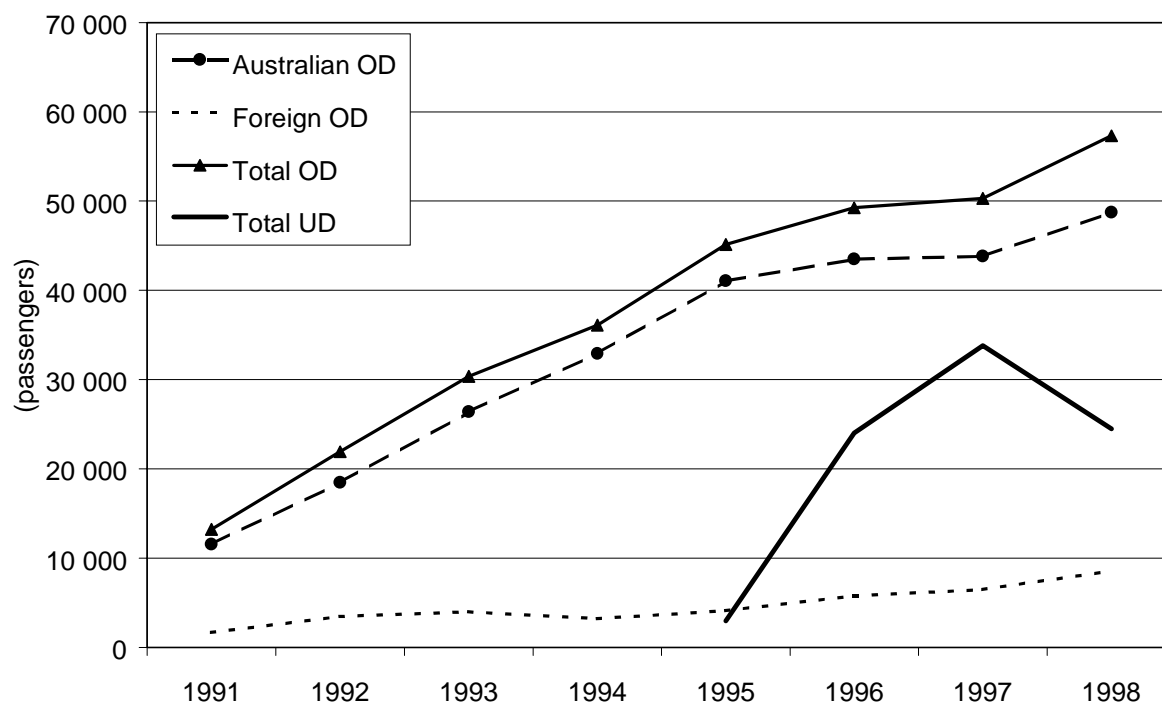
Australia–Vietnam is an aviation market that is served solely by passenger aircraft. Due to the emerging status of the Vietnamese market, it is difficult to ascertain whether the market will continue to be served solely by passenger services; however, in the short- to medium-term this is expected to be the case. As a result, it is necessary to examine the supply of passenger services in order to form a view on the future supply of freight capacity. The supply of passenger services is determined by passenger demand and government regulations. Currently there exists excess capacity negotiated within the air service agreement and dedicated freight services are permitted. Both Australian and foreign airlines were using two of the three available services a week to Vietnam. During the fourth quarter Qantas withdrew, freeing up most of the Australian entitlement.

An eight-year time series of origin–destination (OD) and uplift–discharge (UD) traffic between Australia and Vietnam illustrates the evolution of the passenger market in recent times (figure 55). Between 1991–1998, Vietnamese visitors grew at an average annual rate of 26 per cent, while Australian residents visiting Vietnam grew at an average annual rate of 23 per cent. The market is driven by Australian OD passengers who represented approximately 85 per cent of the market in 1998.

A closer examination of the Australia–Vietnam market reveals several interesting characteristics. Over the period, OD passengers have dominated the market. Prior to 1995, data on uplift and discharge (UD) passenger numbers was not available

indicating that the market was served by intermediate ports in Asia rather than direct flights. However, during 1995 Vietnam Airlines and Qantas commenced/increased direct services, which is shown by the sharp increase in the number of UD passengers between 1995 and 1997. The market changed dramatically during 1998 when the level of UD passengers fell sharply due to Qantas' withdrawal. Qantas remained linked to the Vietnamese market through code sharing agreements with other Asian airlines via intermediate hubs. This can also be seen by the sharper growth in the OD market during 1998.

**FIGURE 55 AUSTRALIA-VIETNAM AIR PASSENGER MARKET—1991–1998**



Note OD = origin-destination traffic, UD = uplift-discharge traffic.

Source Department of Transport and Regional Services, AVSTATS, (1999).

Tourism Forecasting Council (1999) predictions for Vietnam were not available as they were included in a 'remaining other Asia' category. Australian OD passengers grew by one per cent in 1997 and a further 11 per cent in 1998. However, this information is insufficient to form a view of future demand in this market. Due to the small size of the Australia-Vietnam market it is difficult to establish any concrete assumptions, as any errors will have a large effect. Hence, to derive the expected future cargo projection, the current schedules for the Australian-Vietnam market during 1999 have been obtained. Currently, the only airline flying directly to Australia is Vietnam Airlines, which offers three flights per week on a Boeing 767 aircraft. Vietnam Airlines is currently using their full foreign entitlement on this route; however, there is room for further capacity outside the bilateral agreement if increased demand warrants higher capacity. The average seat utilisation for outbound flights to Vietnam in 1998 was approximately 72 per cent. With the number of UD passengers falling over 1998, it is assumed that demand for passenger seats will remain relatively constant to 2000. It is assumed that the fleet configuration will not change and that the number of flights per week will remain constant at three

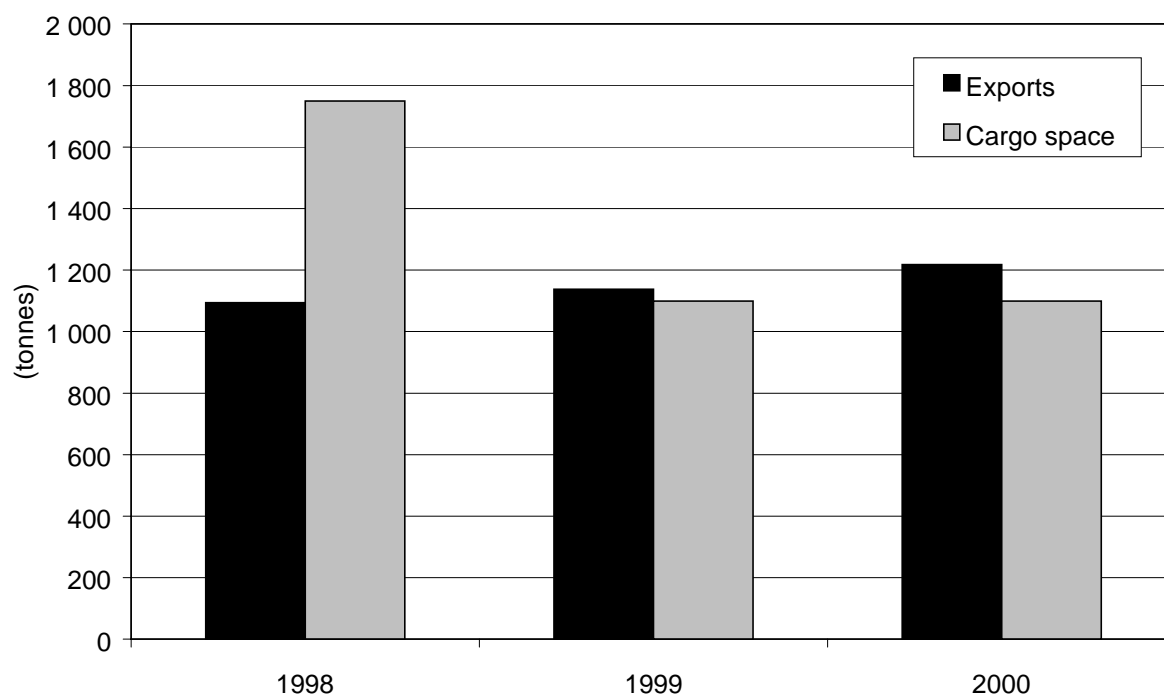
per week. Using these assumptions to convert the number of flights to cargo capacity permits estimation of future capacity levels to 2000. During 1998, the cargo capacity was 1750 tonnes; this is expected to fall in 1999 to 1100 tonnes and will remain at this level during 2000.

*Implications for air freight supply and demand*

Air freight supply and demand for scenario projections into 1999 and 2000 can be compared in the same manner as was done for the four quarters of 1998 (figure 56). It was noted earlier that the Australia–Vietnam market faced no real capacity constraints in 1998. However, under the assumptions made the Australia–Vietnam market is in danger of becoming capacity constrained in 1999 and 2000. The reason for this approaching constraint appears to be due to the commercial decision of Qantas to withdraw from the market rather than a result of regulatory constraints, as there are ample Australian entitlements available.

Qantas currently uses Singapore, Hong Kong and Bangkok as intermediate airports to tranship passengers to Vietnam using code sharing agreements with the national flag carrier. Furthermore, the Vietnamese market is constrained by complex regulations that affect the importation of products. Supermarket to Asia (1998) note that significant portions of imports go via intermediate Asian ports. If the Vietnamese government removes the impediments to trade (particularly to imports outside the Asian region) this route will clearly come under significant capacity pressures and exporters may be forced to use even more indirect routes via intermediate Asian ports to transport their products to Vietnam

**FIGURE 56 AIR FREIGHT SCENARIO, SUPPLY AND DEMAND TO VIETNAM—1999–2000**



Source BTE analysis.

## **CONCLUDING ASSESSMENT**

This study has attempted to shed some light on the complex issue of the adequacy of export air freight capacity. Although the approach has involved the analysis of a considerable amount of data (a large number of commodities carried by over 30 airlines on numerous direct and indirect air links to Asian destinations) it is a broad overview of relevant issues relating to twelve Asian markets.

The study has addressed the question of whether Australian exporters have been adversely affected by reductions in air freight capacity arising from the effects of the financial crisis that originated in Asia .

Export air freight capacity to Asian destinations is predominantly provided in the belly-holds of passenger aircraft. The aggregate supply of capacity to Asian markets is likely to remain subject to the ebb and flow of passenger transport demand. It appears that most Asian markets are recovering quickly.

An economic analysis of belly-hold versus dedicated freight reveals that most Australian freight is carried in passenger aircraft because it is cheaper for exporters and profitable for airlines. Passengers generally yield greater revenue than freight, and in most instances the operation of dedicated freighters out of Australia is not economically viable. Revenues from passengers easily cover costs on combination aircraft, allowing flexible pricing of belly-hold capacity.

This study has used the amount of 'guaranteed' cargo capacity (the weight capacity remaining after allowing for 100 per cent passenger loading and required trip fuel) on routes governed by air service agreements to determine whether any pressures have, or are likely to, occur. This capacity represents the minimum available.

Using this minimum measure, it was found that, although some exporters may have faced constraints in obtaining guaranteed cargo space on their preferred scheduled services, no significant capacity problems were encountered in 1998. However, seasonal pressures appeared to exist in 1998 for Hong Kong, Japan, China, Taiwan and Vietnam.

The scenarios developed for 1999 and 2000 also did not identify any overall capacity pressures, except in the case of Vietnam. However, for some markets, the seasonal pressures appearing in 1998 are likely to persist in 1999 and 2000. Overall, capacity pressures are not expected to occur in the next few years.

This study provides a sensible starting point and a solid base from which to pursue more detailed analyses of the Australian export air freight industry. Possible directions for further work include an investigation of pressures on the air freight

system in each State/Territory and an examination of the adequacy of domestic transport links within Australia.

## APPENDIX I COMMODITY CODE ABBREVIATIONS

<i>Abbreviation used in this study</i>	<i>Australian Bureau of Statistics 2/3 digit commodity code name</i>
Articles of apparel	Articles of apparel & clothing access
Beverages	Beverages
Cereal preparations	Cereal preparations
Chemical	Chemical materials & products. n.e.s.
Coffee, tea, cocoa	Coffee, tea, cocoa, spices
Cork & wood	Cork & wood manufactures (exc furniture)
Crude animal & veg	Crude animal & vegetable materials. nes
Crustaceans, molluscs	Crustaceans, molluscs etc
Crustaceans preserved	Crustaceans, molluscs prep or preserved
Dairy products	Dairy products
Electrical	Electrical machinery and appliances nes
Essential oils	Essential oils, resinoids & perfume mats
Feeding stuff for animals	Feeding stuff for animals
Fish	Fish, salted, smoked, frozen, fresh
Fruit fresh	Fruit, fresh or chilled
Fruit preserved	Fruit, preserved and fruit preparations
General industrial	General industrial machinery & equip nes
Gold, non-monetary	Gold, non-monetary
Inorganic chemicals	Inorganic chemicals
Iron and steel	Iron and steel
Leather etc	Leather, leather manufactures n.e.s.
Live animals	Live animals
Machinery specialised	Machinery specialised particular indust.
Manufactures of metal	Manufactures of metal. n.e.s.
Meat	Meat and meat preparations
Medicinal	Medicinal & pharmaceutical products
Metalworking machinery	Metalworking machinery
Miscellaneous edible	Miscellaneous edible products & preps
Misc manufactured	Miscellaneous manufactured articles nes
Non-ferrous metals	Non-ferrous metals
Non-metallic mineral mfr	Non-metallic mineral manufactures, n.e.s.
Office machines/ADP	Office machines and ADP equipment
Other commodities	Other commodities and transactions
Other transport equipment	Other transport equipment
Paper, paperboard etc	Paper, paperboard & articles of paper
Photographic etc	Photographic equip; optical goods; watches
Plastics primary	Plastics in primary forms
Power machinery etc	Power generating machinery & equipment
Professional & scientific	Professional & scientific apparatus nes
Road vehicles	Road vehicles
Telecommunications	Telecommunications & sound recording equipment
Textiles	Textile yarn, fabrics, made-up articles
Vegetables fresh	Vegetables, roots, tubers, leafy greens
Vegetables preserved	Vegetables, roots, tubers, prep & preserved

Source: ABS International Cargo Statistics (unpublished).





## **APPENDIX II FACTORS UNDERLYING THE SUPPLY OF EXPORT AIR FREIGHT CAPACITY**

### **ECONOMICS OF AIRLINE OPERATIONS IN AUSTRALIA**

This section:

- examines the economics of passenger and freight airline operations in terms of costs, revenues, and factors affecting supply and demand; and
- demonstrates how these factors affect the supply of export air freight capacity out of Australia.

#### **Review of basic airline economics**

Before undertaking an analysis of the economic realities of passenger and dedicated freight aircraft serving the Australian market, it is useful to briefly examine the economics which underpin the operation of the aviation industry. It is especially important to understand the nature of the costs incurred by airlines as well as to review the basics of both passenger and freight services and the consequences of their respective cost structures.

#### ***Factors that affect demand for passenger services***

The route network and capacity of a passenger airline is influenced by a variety of factors on both the demand and supply side of the market. Air travel is classified as a derived demand—consumers do not demand air travel as an end in itself, rather it is the means of achieving another goal such as a vacation or a business appointment. The derived demand nature of the industry has resulted in market segmentation, which enables airlines to divide the market into segments according to the purpose of the trip—business or leisure. There are a number of important distinctions that make these market segments vary considerably. One of the important differences relates to changes in the price of airfares. Leisure travellers who pay for their own fares are more price sensitive than business travellers. Other factors that affect the demand for passenger travel include prices of substitutes and complementary goods, Australian and world GDP, changing preferences and tastes, and the size of the population base.

#### ***Factors that affect demand for air freight services***

Air freight services can be provided in the form of belly-hold space on passenger services, scheduled freighter services, or chartered freighter services. 'Air freight' is generally defined to include freight, air express and mail and is often characterised

by an imbalance of flows. As it is often difficult to match the demand between inbound and outbound capacity, there can be different route networks for freight services compared with those for passenger services (Reynolds-Feighan, 1994, p. 200). This imbalance in air freight movements poses more of a problem with combination carriers, as freight and passenger destinations may not coincide.

Air freight is a heterogeneous product: commodities vary in consignment weight, required delivery time and any special requirements for the export of the product. This heterogeneity can affect the storability of freight in the aircraft and ground handling. However, it is commonly accepted that the routing of cargo is unimportant (including the number of stops or transfers) for the shipper: what is important is the time lapse between pick-up and delivery (Reynolds-Feighan, 1994).

Demand for air freight services depends on the level of international trade, and any factors that affect the growth of international trade will be reflected in the demand for air freight services. The factors likely to affect the demand for air freight include: the price of the air freight service; changes in world and Australian GDP; improved distribution mechanisms and handling facilities (improving the quality of the product); changing consumer preferences for imported products; and trade liberalisation/protection trends. Current worldwide trends toward reducing tariff levels and other protection measures are having a significant impact in opening up new markets for Australian air exports, particularly food. For example, India recently opened up its market to imported fruit and vegetables providing Australian exporters with substantial opportunities (Bromby, 1999, p. 33).

### ***Factors affecting the supply of airline services***

Cost is a primary factor in an airline's decision to supply an aviation service. The other key determinant affecting supply is government regulation in the international aviation market (discussed in a later section). Airlines, like all businesses, will attempt to maximise profits by providing a given quantity and quality of product at the least possible cost combination. Costs facing airlines are generally broken down into two main categories: direct and indirect operating costs. These categories comprise fixed and variable costs. Variable costs change according to the level of output produced, whereas fixed costs remain constant irrespective of the level of output produced.

#### ***Direct operating costs***

Both passenger and dedicated freight airlines face similar operating cost structures in day-to-day business operations. Direct operating costs include all costs that are associated with the type of aircraft being operated and would change if the aircraft type changed. These are the costs associated with keeping the aircraft in the air. The largest proportion of an airline's direct operating costs is related to the costs of flight operations. These include fuel costs, airport and en route charges, air navigation charges, maintenance and overhaul facility costs, depreciation and amortisation of flight equipment, costs associated with crew, passenger provisioning costs and freight handling costs. Although passenger and dedicated freight companies face

similar direct operating cost structures, the actual composition of these costs varies due to the nature of the business.

Costs associated with aircraft crew would be higher for passenger airlines than for freight companies. Crew costs include salaries and the expenses incurred during stopovers. Freighter flight crews usually consist only of the captain and first officers, hence crewing costs are substantially less than for passenger airlines which also include significant numbers of flight crew.

Other direct operating costs that vary significantly between passenger and freighter airlines are those associated with provisioning. The provisioning costs include the costs of providing passengers with in-flight services, such as food, magazines and first-release movies. However, dedicated freighters do incur greater freight handling charges due to the volume of freight uplifted and discharged by each aircraft.

### *Indirect operating costs*

Airlines also face costs unrelated to aircraft operation. Passenger airlines generally face higher indirect operating costs than freight airlines, as they are required to provide passenger facilities in airport terminals. The indirect operating costs that airlines face are ticketing, sales and promotion. Both types of airlines will encounter these costs; however, dedicated freight companies do not face the same level of costs as passenger airlines in terms of the promotion required to maintain and establish market share.

### **Comparison of passenger and freighter aircraft costs**

Based on the foregoing discussion, the relative costs of passenger and freighter aircraft actually serving the Australian export market were analysed. This analysis was then used to shed some light on the relative break-even freight rates required to cover the costs of those different types of aircraft.

The analysis in table 41 broadly indicates the economics of passenger and freighter aircraft operations and suggests why there are only a few pure freight aircraft operating from Australia. Consultation with industry suggests that this analysis is a reasonable guide to the cost and revenue realities of the market.

The assumptions underlying this analysis are as follows:

- The BTE Aerocost 2 model was used to estimate total direct operating cost for each of the aircraft on each of the routes using industry average load factors and assuming the aircraft was loaded to 100 per cent maximum take-off weight. Direct operating costs were then expanded to include airline indirect costs.
- To calculate total revenue per flight on each route three different airfare classes<sup>57</sup> were used along with airline seat configurations<sup>58</sup> and the estimated industry

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<sup>57</sup> The three classes of fare used were full economy (one-way) fare, full business fare and a representative economy discount fare derived from the April 1998 *Air Tariff Worldwide Fares* publication. The representative economy discount fare was estimated by taking the average of the high and low season economy discount fares valid for between 35 days and three months.

<sup>58</sup> Drawn from airline internet pages and issues of the *World Airways Guide*.

average load factors. First class seats were included in the business class category. It was assumed that half of the business seats available were sold to full business fare passengers and 90 per cent of economy seats were sold as discount fares, leaving 10 per cent sold at the full economy fare<sup>59</sup>. The number of seats sold for each of the three fare types was then used with the corresponding April 1998 airfare to calculate the total revenue per flight on each route.

- Total revenue was then reduced by assuming that nine per cent commission is paid to travel agents on all flights sold<sup>60</sup>. The cost and revenue estimates were then used to calculate the average freight cost per kilogram for dedicated freight flights, the marginal cost of freight for passenger services and to determine whether passenger revenues covered total costs on those flights.

**TABLE 41 COST AND REVENUE ANALYSIS**

<i>Aircraft Type</i>	<i>Route</i>	<i>Total Cost<sup>a</sup></i>	<i>Revenue (pax)</i>	<i>Average freight rate per kg to cover costs (freighters)</i>
B777-200	Brisbane (Int) to Seoul	\$150 000	\$225 000	
B747-200F	Brisbane (Int) to Seoul	\$130 000		\$1.62
B747-200F	Sydney (Int) to Bangkok	\$125 000		\$1.50
B747-400	Sydney (Int) to Bangkok	\$185 000	\$225 000	
B747-200F	Melbourne (Int) to Singapore	\$115 000		\$1.12
B747-400F	Melbourne (Int) to Singapore	\$130 000		\$1.20
B747-400	Melbourne (Int) to Singapore	\$160 000	\$235 000	
A340-300	Perth (Int) to Singapore	\$75 000	\$120 000	
B747-400	Perth (Int) to Singapore	\$105 000	\$185 000	
B767-300ER	Perth (Int) to Singapore	\$65 000	\$95 000	
B747-400F	Perth (Int) to Singapore	\$95 000		\$0.82

a. Estimated according to assumptions outlined in the section on analytical approach. These costs are intended to be indicative only and represent the mid-point of a wide range of costs across the industry. Average fuel price is estimated to be 30 cents Australian per litre.

Source BTE estimates.

The first thing to note from table 41 is that passenger revenues cover operating costs. This gives airlines considerable flexibility in their pricing of belly-hold freight capacity and allows them to apply marginal cost pricing principles. According to the analysis, marginal freight costs on the chosen routes range between 15 to 20 cents per

<sup>59</sup> The seats available for economy class were divided into full economy and discount economy based on the purpose of travel breakdown in BTCE Working Paper 20 (1995, pp. 8–15). This paper reported that 80–90 per cent of the Asian markets examined in this study comprises leisure travellers. It was also assumed that these leisure travellers will seek to obtain the cheapest fare possible.

<sup>60</sup> This assumption will cause revenue to be overestimated to some extent, because not all seats are sold through travel agents.

kilogram. Hence, freight is a by-product for passenger airlines, which only need to cover marginal costs when carrying freight. Dedicated freight companies do not have this option: they need to cover the full average costs per kilogram (which varies between \$0.82 and \$1.62 depending on the route chosen).

Table 41 also sheds light on the value of carrying freight versus passengers on aircraft. Using a Boeing 747-400 on the Melbourne–Singapore route as an example, the average revenue generated by even the discount economy passenger fare (\$6.35 per kilogram) is far above the air freight rate to Singapore of \$1.05 per kilogram estimated in *Jet Fresh: Paddock to Plate* (1996, p. 35). This example clearly illustrates the economics underlying freight as a secondary product for passenger airlines whose main focus is the high yielding passenger market.

The analysis also shows that airlines are unable to generate the same level of revenues from pure freighters as from combined passenger and belly-hold freight services. For example, on the Melbourne–Singapore route, airlines would have to charge \$2.16 per kilogram (when the average freight cost per kilogram is \$1.20) to cover the operating costs of a dedicated freighter service and receive the same revenue return (assuming 100 per cent loads). On the Perth–Singapore route, airlines would have to charge \$1.64 per kilogram to achieve the same revenue return as a combined passenger service.

There are several implications associated with freight being a secondary product for passenger airlines. The capacity of airlines to quickly reschedule flights in response to changing market conditions (within an established network) means that if passenger markets contract or grow rapidly (as they did in the Asian crisis) airlines may react by adjusting services to passenger markets, thereby affecting freight.

It is clear from the above analysis that the reason why most freight is carried out of Australia in the belly-holds of passenger aircraft is that the economics of the market compels it. The supply of freight capacity out of Australia is, therefore, driven by economic viability issues (or market forces) rather than by any artificial constraints. Belly-hold freight capacity can be supplied by passenger airlines as a cheap secondary product in a market driven by passenger demand. While this continues to be the case, the supply of freight capacity to Australian exporters will remain subject to trends in passenger markets.

### ***Air freight rates***

Delving into the complexities of export air freight rates was not within the scope of this study. However, this study has explored the costs of supplying air freight space, and information from the 1996 *Jet Fresh* inquiry has been included to provide an indicative set of numbers to compare with the cost analysis. The *Jet Fresh* inquiry (1996, pp. 35–39) heard evidence indicating that air freight rates ex-Australia were among the lowest in the world. Witnesses from TNT Ltd presented information comparing air freight rates (for passenger aircraft) to Hong Kong, Singapore and Tokyo ex-Australia; ex-New Zealand via Sydney and ex-New Zealand. These rates are presented in table 42.

**TABLE 42 COMPARISON OF AIR FREIGHT RATES (AUSTRALIAN DOLLARS PER KILOGRAM)**

<i>Destination</i>	<i>Ex-Australia</i>	<i>Ex-New Zealand via Sydney</i>	<i>Ex-New Zealand</i>
Hong Kong	1.26	2.06	2.78
Singapore	1.05	1.85	1.89
Tokyo	2.70	3.50	3.66

*Source* House of Representatives Standing Committee, 1996, p. 35.

Other evidence presented to the inquiry on freight rates for passenger aircraft showed rates to be much lower than that presented by TNT Ltd. The following was the range of prices per kilogram:

- \$0.53 for some flights to Singapore.
- \$1.00 for Darwin-Hong Kong in peak season (compared with \$1.80-\$2.25 on a freight charter).
- \$1.32 for Australia to Tokyo.

Only one airline presented evidence on dedicated freighter rates from Australia. These rates were consistent with the general view that outbound freighter rates are much lower than inbound rates because of the imbalance of freight flows (with much larger volumes of freight imported than exported). Qantas presented evidence to the inquiry on dedicated freight rates for its aircraft flying the Melbourne–Darwin–HongKong–Melbourne route illustrating the extent to which operators (airlines) are prepared to subsidise freight rates ex-Australia.

Qantas showed that the cost per kilogram is \$1.43 at 100 per cent load factor and \$1.68 at 85 per cent load factor. Qantas stated that these rates do not include a profit margin and that consistent load factors of even 85 per cent can only be expected in the short peak season. Average freight costs for dedicated freighters estimated in this study were in the range \$0.82 to \$1.62. The estimate of \$1.50 for the Sydney–Bangkok route, which is a similar distance to Melbourne–Hong Kong, is in line with the Qantas estimate of \$1.43. The crosscheck provides support for the conclusions drawn in this study.

Actual average rates ex Australia to Hong Kong were estimated to fluctuate between about \$0.80 and \$0.95 per kilogram. Qantas argued, therefore, that the viability of any freighter on this route is possible only by using the high inbound demand and rates to subsidise the outbound load. Market rates ex Hong Kong (\$3.20 per kilogram) at that time allowed the round trip operation to be sustained.

The spectrum of prices for belly-hold and dedicated freight presented here vary according to a large number of factors. The assumptions, timeframe and market conditions are just a few of the variables underlying the different data sets. As a result, they are presented only to highlight the key findings of this analysis—the higher average costs of dedicated freighters, and that it is only the existence of Australia’s large (and realistically priced) inbound freight market that allows dedicated freighters to provide an outbound service for exporters.

Discussions with industry further confirmed that it is Australia's strong inbound freight market that drives the dedicated freighter industry. Airlines argued that without the inbound market, dedicated freighters would not serve the Australian market and freight rates incurred by Australian exporters would be considerably higher. This fundamental reality means that demand for cargo space by Australian exporters has little actual impact on how freight capacity is supplied to the export market. As a result, airlines believe they have little, if any, incentive to react to any capacity shortages identified in this study. The underlying fact is that there is always cargo space at a price; but the realities of the market mean that some exporters may not be able to afford to pay the price necessary to equate demand with what airlines are willing to supply.

Freight rates, even for particular flights, can vary considerably with airlines practicing differential pricing across different days and even flights within the day. In other words, airlines do offer price incentives to move export cargoes on less preferred days or flights. Advice from industry confirms that capacity demand must be viewed as a 'window of time' rather than just one or two preferred flights. Airlines argue that plenty of capacity exists on flights other than prime flights, and that in reality, it is common that for many commodities the time differences involved do not matter.

## **DEDICATED FREIGHTERS OUT OF AUSTRALIA**

At the end of 1998, there were ten companies offering dedicated freight services from Australia to various destinations within Asia and connecting services outside Asia. Of these ten companies, five are pure dedicated freight airlines (Evergreen, Polar Air, Martinair, American International and Federal Express) while the others (Qantas, Singapore Air, Cathay Pacific, Korean Air and Malaysia Airlines) are passenger airlines that also run dedicated freighter services.

The type of freight aircraft and the available capacity on these aircraft varies between the various Boeing 747 models and McDonnell Douglas MD11 freighters<sup>61</sup>. The available capacities of these aircraft are considerably larger than similar passenger aircraft. Singapore Airlines' Boeing 747-400 freighter has a maximum available capacity of 115 tonnes of freight, while Qantas' Boeing 747-200 freighter has available freight capacity of 95 tonnes. Qantas also operates an MD11 freighter (but this aircraft is not used on its international flights) that has available capacity of 71 tonnes, which is somewhat smaller than the capacity of 89 tonnes offered by Korean Air on its MD11 freighter services.

A comparison of passenger with freighter aircraft of a similar size reveals that freight capacity on passenger aircraft is between one-quarter and one-fifth that of dedicated freight aircraft. Qantas' Boeing 747-400 passenger aircraft has approximately

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<sup>61</sup> Data relating to airline and aircraft freight capacity have been obtained from the official airline websites of Singapore Airlines, Qantas and Korean Air. These can be found at [http://www.singaporeair.com/sne\\_frame.html](http://www.singaporeair.com/sne_frame.html), <http://www.qantas.com/>, <http://www.koreanair.com>

21 tonnes of available capacity, while its Boeing 747-200 has 19.5 tonnes. Other airlines flying the same type of aircraft have similar capacity available, such as British Airways, which has approximately 17.5 tonnes available. It is clear that the available freight capacity of dedicated freight aircraft far outweighs that of passenger aircraft.

Dedicated freight services to/from Australia are concentrated out of both Sydney and Melbourne airports with only a few selected services out of Brisbane, Perth and Adelaide. In the first quarter of 1998, there were 21 weekly dedicated freight services out of Australia, of which nine left directly from Sydney and five directly from Melbourne. A further five flights departed from both Sydney and Melbourne, while the two remaining flights left from other airports as the final exit point out of Australia after first stopping at either Sydney or Melbourne. As 1998 progressed, Federal Express commenced five services a week out of Sydney, and Korean Air added Brisbane as its final port of call en route to Seoul.

The routing choice of airlines depends on the type of operation and service that the airline attempts to provide. Airlines complementing their passenger services (Korean Air, Qantas, Cathay Pacific and Malaysia Airlines) through the provision of dedicated freight services generally provided direct country-to-country services, with the exception of Singapore Airlines, which also provided a bi-weekly service between Singapore and New Zealand via Australia. Meanwhile, dedicated freight airlines, such as Polar Air, provide multiple country stops throughout Asia en route to its home country of America, as it does not have access to home country hubbing facilities in Asia. There is one exception—Federal Express—which uses Subic Bay in the Philippines as a hub for its Asian and Pacific operations. The routing chosen by these airlines vary; however, most airlines incorporate several stops en route to Australia, including several stops in the Asian region (Singapore, Thailand, Hong Kong, Taiwan, Japan, the Philippines or Russia) before flying back to America. The whole journey can incorporate up to 11 stops to reach the final destination.

### **Charter freight flights**

Charter freight flights are an alternative for exporters whose demands are not met by scheduled passenger and freight services. Historically, charter freight allocations are not taken into consideration when governments determine freight capacity through bilateral air service agreements. The Report of the House of Representatives Standing Committee *Jet Fresh: Paddock to Plate* (1996) found that any shortfall, over and above scheduled passenger and freight capacity negotiated in the bilateral agreements, can be met by ad hoc freight charters.

In 1996, the Hon. John Sharp, then Minister for Transport and Regional Development, announced changes to Australia's air freight policy in order to develop and create new markets. This was to be achieved through liberalising air freight and freight charter services to and from Australia.

The international passenger and freight guidelines introduced by the Commonwealth Government in June 1996 provide for automatic approval of proposed charter programs of up to three months and up to 12 months automatic approval for freight programs where the applicant is not currently operating



scheduled services to and from Australia and is able to demonstrate the carriage of a high level of Australian exports.

## **THE ROLE AND INFLUENCE OF THE GOVERNMENT**

The role of the Government in determining the economic regulation of the air freight industry is limited to negotiating dedicated freight capacity in air services agreements. Scheduled airline capacity between countries is determined through bilateral negotiations of air service agreements. These agreements establish a country's entitlement of passenger capacity, the level of flight frequencies, the permitted routing alternatives and whether dedicated freight services would be allowed. These agreements can also determine tariff ranges, the type of aircraft to be used, and what airports can be utilised by international airlines for their services. The position each bilateral partner takes on these issues at negotiations is determined by their national interest. The outcome of each negotiation on air service entitlements is a 'best fit' of the national interests of the two parties. Once the capacity has been negotiated for both Australian and foreign airlines, there is no guarantee that the full entitlements will be taken up by the airlines. Airlines will determine supply based on their commercial assessment of current and future demand expectations.

The Australian Government negotiates through its air service agreements whether dedicated freight services will be permitted and/or whether a conversion rate that allows airlines to exchange passenger services for dedicated freight services can be applied. This is the only involvement the Government has in directly determining dedicated freight capacity. However, the Government has indirect influence on the level of freight capacity through the negotiation of passenger capacity agreements. The majority of freight moving to and from Australia is carried in the belly-hold of wide bodied passenger aircraft.

Since the Government's policy of liberalising freight arrangements was announced in June 1996, freight capacity has been liberalised to/from Australia. Australia has negotiated air service agreements that permit designated airlines to determine the type of aircraft, frequencies, capacity and routing according to the market demand between Australia and 17 of its bilateral partners as at July 1999.

The Government has also negotiated 133 additional Boeing 747 equivalent units of available freight capacity in air service agreements with bilateral partners that do not permit open freight capacity. In April 1999, 28 units of dedicated freight capacity operated between Australia and its bilateral partners.

Air service agreements will only act as a constraint when airlines cannot supply any further capacity because restrictions under the bilateral agreements do not permit any further flights and all available belly-hold freight capacity is being utilised. A second possible constraint on capacity resulting from an air service agreement is the degree of inflexibility built in to the agreement that prevents airlines from deciding which airports to service. The Government's new international aviation policy, released on 3 June 1999, is aimed squarely at negotiating away the remaining capacity and route impediments under Australia's air services agreements.

As at 30 June 1998, Hong Kong was the only market that appeared to be facing a passenger capacity constraint. The total Australian entitlements had been utilised and the Hong Kong entitlements were approaching capacity. This study has found that, at the overall level, freight capacity to Hong Kong did not face any constraints in 1998, although seasonal pressures did exist which the Aviation Division of the Department of Transport and Regional Services advised were accommodated through supplementary capacity agreed by the Australian and Hong Kong Governments. In total, there were only a small number of markets that were facing any form of capacity constraint in the number of allowable passenger flights. This suggests that any market that currently faces freight constraints results from airline decisions not to increase passenger services.

A final point is that currently the air service agreement between Australia and the US does not provide traffic entitlements for air cargo services between Australia and North Asia for US airlines (such as Polar Air). However, full fifth freedom traffic rights are available for US carriers making a stopover in South-East Asia. As a result, freight capacity offered by US airlines on direct routes to North Asian countries were excluded from this analysis.

## **APPENDIX III THE CHANGING FACE OF THE AIR FREIGHT BUSINESS**

### **INDUSTRY TRENDS**

In the 1990s, the emergence of integrators—total logistics providers and contractors (who provide freighter lift capacity to other carriers and integrators)—signalled the start of complete logistic solutions and seamless origin-destination services on a global basis with a much greater customer focus. These factors are currently changing the face of the air freight business across the world in a variety of ways.

Since the 1960s, when the large-scale air freight business emerged, it has enjoyed considerable growth. In the 1990s, several strategic shifts have been forcing the air freight business to re-evaluate its operation and service direction. These include:

- the greater recognition of the importance of the role of logistics in worldwide business and the corresponding rapid growth in total logistics solution providers;
- the extent and importance of increasing globalisation and competition in the aviation industry, leading to a greater focus on the type and quality of the services provided; and
- trends toward greater cooperation, partnerships and alliances as a means of responding to globalisation and service pressures.

As a result of these influences, the air freight business is now undergoing a period of substantial change to deal with the threats and opportunities confronting it. The paths taken have varied, with some airlines choosing to stick with existing ways of doing business and others embracing new opportunities.

While air freight remains secondary to the passenger market for passenger airlines (as the analysis in appendix II showed) there has been increasing recognition of the revenue and value-adding opportunities available in the industry. For many 'air cargo is now recognised as a lucrative market in its own right, with growth rates averaging double those of the passenger business' (Gallacher, 1998, p. 52). It has also been argued that the air freight market is rapidly switching from a transport commodity to a value-added part of the logistics chain (Philipson, 1998, p. 65).

The air freight business is certainly becoming more independent from passenger operations, as airlines increasingly opt to establish cargo arms as separate group subsidiaries (eg. Lufthansa Cargo and Swisscargo) or distinct operations, each

operating as a separate profit centre purchasing 100 per cent of its parent carrier's belly-hold space (eg. KLM Cargo and British Airways World Cargo).

Several airlines are indicating an expansion into the broader logistics industry by offering total logistics solutions. The arrival of large US integrators in the air freight market has forced airlines to consider expanding operations into activities further up the logistics chain. These integrators offer door-to-door services via a seamless global logistics network. Examples include Federal Express, DHL Worldwide and United Parcel Service (UPS). The basic strength of integrators lies in their service speed and effectiveness as a single-source supplier of forwarding, consolidation, time-defined transport and brokerage. Their major weakness is their inflexibility, since they only provide standardised services for relatively small and lightweight products (Ferreira and Lenoir, 1998, pp. 2-5).

There are sound economic arguments for expanding into the broader logistics business—primarily the added value to be gained from offering total solutions to customers. Expanding into the wider logistics business is one way airlines have responded to increasing globalisation and competitive pressures which have forced them to intensify their focus on the type and quality of the services they provide. Operating an expanded logistics freight business may also help cushion against tumbling yields when times are tough. A broader logistics network can also address the problem of how to fill aircraft on the return leg of a trip (Gallacher, 1998, p. 52).

Singapore Airlines has stated that its major aim is to become a total solutions provider rather than just the air freight component of the supply chain. It has already begun informal discussions with about twelve large freight forwarders and logistics companies in Australia and is planning capacity increases out of Australia in early 2001 (as a result of the opening of its dedicated Cargo Terminal No.6 in Singapore). This new facility has a particular ability to handle perishable cargo (LLDCN, 30/6/99, p. 6).

US airlines, however, are showing a greater reluctance to pursue their cargo business down the total logistics route. Their core business remains the sale of belly-hold capacity to forwarders. They argue that it is still a price-driven business, and many have been deterred from vertical integration by the presence of big US integrators such as Federal Express and UPS (Gallacher, 1998, pp. 52-54).

Some of the major European carriers (eg. Lufthansa Cargo, Swisscargo, KLM Cargo and BA World Cargo) have begun building relationships with customers and offering new levels of logistics service (eg. airport-based packaging and storage operations, even for perishables). SAir Group has gone further than most, creating a division called SairLogistics, which covers all the services necessary to provide door-to-door service—including Swisscargo, a trucking operation, a handling company and a freight forwarding company all working together to provide direct customers with guaranteed services. A large proportion of KLM Cargo's business (30-35 per cent) also now falls under the door-to-door category of its business. Lufthansa Cargo separated from its passenger parent in 1995 and has since built ten long-term business relationships with forwarders to provide major shippers like BMW and Sony with a reliable worldwide logistics chain (Gallacher, 1998, pp. 54-55).

This trend toward the building of long-term business relationships and the creation of global alliances among passenger airlines (eg. Star and Oneworld) opens up the prospect of similar moves occurring in air freight. Each of the major European cargo players is linked to a global passenger alliance, but there are many reasons why global freight alliances are unlikely to be exact replicas of their passenger counterparts. This is primarily due to the different freight strategies being pursued by airlines—some want to work with forwarders, while others want to compete with the forwarders for business (Gallacher, 1998, p. 55). The move toward more long-term relationships and partnerships in the air freight industry mirrors general logistics trends across the world.

Freight alliances are in very early stages of development, but they are being discussed. Lufthansa Cargo is reported to be having discussions with Star Alliance partners SAS and United. Greater cooperation between Lufthansa Cargo and Singapore Airlines in the operation of express freight services in the Asia-Pacific region and Europe has been announced. Lufthansa Cargo has also made similar arrangements with SAS Cargo. In March 1999, these three cargo carriers took a further step towards an air freight partnership by announcing that they were planning closer cooperation in the air freight business (Noonan, 29/3/99, p. 3). Ansett Australia has confirmed that members of the Star Alliance will forge closer ties to drive air cargo initiatives. Plans by several airlines, including Star Alliance's six founders, to launch a worldwide air freight alliance have also recently been reported (LLDCN 26/5, p. 8).

The creation of global passenger alliances has also had direct implications for belly-hold freight. It not only gives exporters more capacity but also creates the opportunity for airlines to use these alliances to enter new markets and gain access to more worldwide hub airports. For example, Singapore Airlines has joined with Japan Airlines enabling them to offer belly-hold freight capacity to Tokyo. All of this improves the way in which airlines serve their customers.

The drive to standardise the information and communication technologies required to track and trace shipments is crucial to the formation of any freight alliances. *Cargo 2000* is an alliance of major forwarders and airlines grouped to standardise business practices like EDI to ensure compatibility (Ferreira and Lenoir, 1998, p. 15).

Another factor causing changes in the way airlines approach their business is the consolidation of the once fragmented freight forwarding sector. This trend is creating sizeable global players (eg. Europe's Panalpina) able to take advantage of expanded networks and economies of scale (Gallacher, 1998, p. 54).

The extent to which these current trends toward providing a total logistics solution through cooperation will continue is difficult to assess. These trends are resulting in greater concentration and cooperation at both the airline and forwarder level of the air freight industry, as well as a greater focus on the quality and type of service provided to the customer.

Improvements in the maritime cold chain through the use of new technologies, such as, 'cool containers' are increasingly allowing perishable freight to be transported at lower costs on ships (with quality levels maintained). This trend poses a threat to the

traditional dominance of air freight as the only mode available to exporters of perishable produce. The extent of any modal shift caused by such factors is not clear at this stage and there are many other factors affecting the competitiveness of modes that may reinforce or offset these technology improvements. However, there is no doubt that as refrigeration for ships' cargo continues to improve, more perishables are likely to be transported by sea rather than by air (for example, table grapes, fish and crustaceans).

One final industry trend to note is the view that new passenger aircraft are becoming less 'freight-friendly'. Airlines confirmed that the cargo space available for freight on some newer aircraft has been unintentionally reduced. This reduction in cargo capacity is not a result of cargo hold dimension changes, but rather a result of greater equipment weight on the passenger deck. New first and business class configurations and in-flight video in economy seats have reduced cargo space by a couple of tonnes on a typical Boeing 747-400 aircraft. However, it is important to recognise that technology is constantly changing and as such there are always offsetting factors (such as engine upgrades) that influence the amount of cargo space supplied on aircraft.

## **INDUSTRY FORECASTS**

The Boeing *Current Market Outlook* (Boeing, 1999) predicts that passenger traffic growth will average 4.7 per cent a year and cargo traffic growth will average 6.0 per cent a year from 1999 to 2008. These growth rates will drive the world jet fleet to 17 700 planes at the end of 2007 up from the 12 300 planes at end of 1997. Boeing believes that used aircraft will meet most future freighter requirements. The outlook shows a small requirement for new freighters due to the expected large number of low-priced used planes available for conversion.

The freighter fleet is forecast to grow by 190 additional large-capacity freighters, 155 medium-capacity wide body freighters and 140 small freighters. Medium-capacity, standard-body freighters will decrease by nearly 65 planes by 2008. Boeing believes that continued increases in the use of lower hold capacity on passenger planes will create further downward pressure on cargo yields, causing many airlines to convert older aircraft to freighters rather than buy new freighters. As a result, Boeing predicts 650 new freighters will be required between 1998 and 2017 (worth \$77 billion in 1997 US dollars). According to Boeing forecasts, over 70 per cent of the future freighter fleet will be modified aircraft.

Airbus forecasts (Airbus, 1999) that passenger traffic will grow at an average annual rate of five per cent, while cargo traffic growth will average 5.9 per cent a year over 1999–2018. The capacity of the dedicated freighter fleet is forecast to grow from 64 000 to almost 180 000 tonnes over this period. Airbus believes that dedicated freighters will assume a larger share of world air cargo traffic, growing more rapidly than passenger aircraft belly/combi services. As a result, freight tonne kilometres (FTKs) carried by dedicated freighters are predicted to grow at an average rate of 6.3 per cent a year, and the active freighter fleet is forecast to grow from some 1450 aircraft at end 1998 to 3400 by end 2018. During the same period, the average

capacity of the dedicated freighter fleet is forecast to increase from 44 to more than 52 tonnes, with large freighters increasingly dominating the fleet.

Continuing robust air freight growth will produce substantial demand for new and used aircraft according to Airbus. They predict that during the next 20 years, 1086 (three-quarters of the current fleet) will be retired. The need to replace them, and to acquire an additional 1969 aircraft to accommodate cargo traffic growth, will combine to create demand for a total of 3055 freighters. According to Airbus (and similar to Boeing predictions) three-quarters of this demand will be satisfied by passenger-to-freighter conversions, leaving a requirement for delivery of 750 new freighters worth approximately \$95 billion during the forecast period.

Both aircraft manufacturers agree that the demand for new freighters will not be great, that a significant part of total air freight will continue to be carried in passenger aircraft bellies (and combi aircraft) and more than 70 per cent of freight aircraft requirements will be met by converting old passenger aircraft into freighters.





## **APPENDIX IV THE FINANCIAL CRISIS**

In recent times Australia has focused its trading attention within the Asia-Pacific region. For this reason, the financial crisis is likely to have had an effect on the Australian economy through lower exports and tourism numbers. The aim of this appendix is to trace the causes and effects of the crisis and the likely outcome for Australia.

Up to 40 per cent of Australia's exports go to the Asian region. The financial crisis is therefore also expected to affect Australia's current account position as exports fall. The financial and economic crisis that originated in Asia was not a new phenomenon. Many countries have been affected by similar crises during the nineteenth and twentieth centuries. However, what was interesting about the 1997/98 crisis was that it hit what had been the most rapidly growing economies of recent times.

Although the nature and the extent of the financial crisis was not predicted by economists, several observers did raise warning flags that suggested a slowdown in economic growth. There are two main hypotheses on the causes of the crisis that have been proposed in its aftermath. According to Corsetti, Pesenti and Roubini (1998a) one view relates to sudden shifts in market expectations and confidence resulting in financial turmoil. The other view is that the crisis reflected structural and policy distortions in the countries of the region.

### **CAUSES OF THE FINANCIAL CRISIS**

There was no single cause of the financial crisis, but there were many interrelated factors that combined to result in several countries getting to the brink of bankruptcy. One of the leading factors behind the crisis was a sudden and huge change in capital flows. Prior to the crisis, the five countries<sup>62</sup> most seriously affected by the crisis had net private capital inflows of \$US 93 billion, which dropped to -12.1 billion (a swing of \$US 105 billion) (Radelet and Sachs, 1999, p. 2). In this situation an economy is left vulnerable to liquidity problems if there is a sudden withdrawal of foreign capital. This occurred as Thailand, South Korea and Indonesia had an extremely high short-term debt ratio (the ratio of Malaysia and the Philippines was not as high and the effect of the crisis was not as harsh) that allowed citizens and foreign organisations to withdraw loans and capital.

A large and sudden withdrawal of foreign capital will have dramatic macroeconomic and microeconomic effects on an economy. Immediately, there is a depreciation of

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<sup>62</sup> South Korea, Indonesia, Malaysia, the Philippines and Thailand

the local currency (due to demand for foreign currency and the supply of local currency increasing) and domestic interest rates rise as foreign credit is withdrawn and domestic credit is tightened. The combination of a real exchange rate depreciation and sharp increases in interest rates led to a rapid rise in non-performing loans in the banking system of Asian economies (Radelet and Sachs, 1998). This forced businesses into bankruptcy, as they were unable to meet their debt repayments. The collapsing banking systems combined with depreciating currencies resulted in a contractionary shock to the Asian economies, which was worsened by a fall in private investment.

The next section will draw heavily on interpretations by Radelet and Sachs (1999) of events that led to the crisis. Radelet and Sachs (1999) examined four possible reasons for the financial crisis. These factors, in combination, placed the Asian economies in a precarious situation.

- Weaknesses in the Asian economies.
- Moral hazard.
- Creditor panic.
- Exchange rate devaluation.

### **Weaknesses in the Asian economies**

Inherent weaknesses within the Asian economies were one of the reasons behind the crisis. These weaknesses included rapidly expanding and under-supervised financial systems, large short-term capital inflows financing weak investments, and a sharp decrease in the growth of export revenues.

Countries most affected had liberalised their financial institutions, which led to a rapid expansion in their financial sectors as new private banks commenced operations and foreign lending increased. The combined effect of increased foreign borrowing and domestic lending led to a private investment boom. The increased demand for credit was unable to be satisfied domestically; hence domestic banks were forced to borrow heavily offshore, which increased the foreign capital inflows. The first problems began to creep into the system when governments that actively sought to liberalise financial markets were unable to regulate or supervise (through prudential controls) the actions of banks.

The fixed exchange rate regimes (or exchange rate changes that were considered predictable) exacerbated the financial crisis. As Radelet and Sachs (1999) state, fixed exchange rate regimes encourage short-term capital inflows, as investors perceive there is little likelihood of exchange rate movements resulting in losses. This leads to a real exchange rate appreciation, as prices of tradeable goods and services remain relatively fixed while prices of non-tradeable goods and services appreciate rapidly due to the investment boom. This resulted in an over-valuation of the Asian currencies.

The growth in aggregate demand began to slow during the mid-1990s as the level of exports began to fall off. Most Asian communities saw export growth rates fall to varying degrees in value terms as export prices weakened. Both Indonesia and

Thailand saw export volumes actually fall. A combination of factors affected the export competitiveness of Asian countries. These ranged from increased competition from other countries (resulting in a glut of commodities on the market) to real exchange rate appreciation. One of the factors driving the appreciation of the real exchange rate was the appreciation of the US dollar and European currencies against the Japanese yen. As the Asian currencies were pegged to the US dollar, the currency appreciation resulted in the deterioration of the cost competitiveness of these nations. The effect of the slowing in export growth on aggregate demand was not sufficient to cause the economic collapse; however, it did affect the confidence of creditors that debt servicing would be maintained.

### **Moral hazard**

Observers consider that the moral hazard/asset bubble view did play a leading role in the financial crisis. Private investors believed that governments would bail them out of any problems if the need arose, even though explicit guarantees were not given. During previous economic crises the IMF bailed out Mexico and Russia. Asian investors and companies were under the impression that similar safety nets would be provided if required.

The second moral hazard argument illustrated by Radelet and Sachs (1999) is based on the belief that creditors felt secure that they would be repaid for lending to specific projects that were controlled by companies with close connections to the government. The moral hazard problem in Asia magnified the financial vulnerability of the region during the process of financial liberalisation in the 1990s, exposing its fragility vis-a-vis the macroeconomic and financial shocks that occurred in the period 1995-1997 (Corsetti et al., 1998a, p. 2).

The moral hazard was not only attributed to the wayward lending practices of domestic financial institutions, but also to international lenders. Domestically, banks borrowed excessively from abroad to finance projects domestically that would only achieve marginal investment returns, while international banks did not undertake robust risk management techniques during the lending process.

Corsetti et al. (1998a) argued that the core implication of moral hazard is that an adverse shock to profitability does not induce financial intermediaries to be more cautious in lending, or to follow financial strategies reducing the overall riskiness of their portfolios. This is exactly what occurred as financial institutions took greater risks in their lending patterns as they foresaw possible future bankruptcies. Corsetti et al. (1998a, p. 4), in outlining the behaviour of financial intermediaries, cited Krugman: 'to play a game of heads I win, tails the taxpayer loses'. The cumulative effect of the financial imbalances exposed the Asian countries to falling market confidence as the economic fundamentals of the countries deteriorated. This was exacerbated by dramatic asset price falls, which led to financial and corporate losses and defaults on loans.

### **Creditor Panic**

Radelet and Sachs (1998) state that the third reason put forward to explain the financial crisis is self-fulfilling panic of investors. Vulnerabilities such as falling foreign exchange reserves, slowing export growth, fragile financial systems, and overvaluation of the real exchange rate are identified as the cause of creditor panic. Radelet and Sachs (1998, p. 11) argue that these problems were not enough to explain the abruptness and depth of the crisis. However, they also argue that the unanticipated nature of the crisis suggests that it cannot be easily explained by fundamentals. Three other factors also lend support to the argument: the fact that the crisis only hit countries in a vulnerable position; the crisis hit countries with widely varying fundamentals; and the crisis eased after a year or so despite little change in the fundamentals of most countries.

### **Exchange rate devaluation**

Radelet and Sachs (1998) discount the devaluation of the Thai baht as being one of the reasons behind the crisis; however, the pegged exchange rate that preceded the devaluation is considered to be one of the causes of the crisis. The devaluation was merely the catalyst. Under this system of fixed exchange rates, countries are forced to use their foreign exchange reserves in order to defend the peg once market traders believed the currency was overvalued. This only allows currency pegs to be maintained until currency reserves are depleted. When this happens, a country is forced to break its commitment to the currency peg, inciting financial panic in the community as the currency is devalued. As Corden (1998) explains, banks, non-bank financial intermediaries and corporations borrowed short-term in dollar-denominated form (or in yen) and failed to hedge their debts. Hence, the depreciation of the currency resulted in foreign currency liabilities rising sharply and bankrupting many in the process.

There have been many reasons put forward as to why the financial crisis affected the region so severely. However, each of the affected countries had a different set of reasons for why and how they were affected. The next section will examine some of the triggering events for each of the five countries.

### **THE EFFECTS OF THE CRISIS**

One of the interesting facets of the financial crisis was the extent the problems of one country had on several other countries in the region. For example, Thailand in the process of exhausting its financial reserves in a futile defence of the baht, set in motion a chain of events that developed into a crisis (Radelet and Sachs, 1999).

The financial crisis did not happen out of the blue, but once the crisis occurred, it engulfed several countries quickly. The first cracks appeared early in 1997 when Hanbo Steel went bankrupt owing huge debts (the first chaebol or South Korean conglomerate to collapse in a decade). Within several months, several other large corporations suffered the same fate, putting added pressure on merchant banks with large foreign borrowings.

In Thailand, several companies missed their foreign debt repayments, while bad debts increased due to the property downturn. In the process, the Bank of Thailand used most of its foreign exchange reserves in maintaining the liquidity of distressed financial institutions. Radelet and Sachs (1998) state that the Thai government's removal of support from a major finance company (resulting in losses for creditors) caused the withdrawal of foreign funds and prompted the currency depreciation on 2 July 1997. The devaluation of the Thai baht has been regarded as the catalyst leading to the capital outflow from the rest of East Asia.

At the same time as there were problems in South Korea and Thailand, Malaysia was also suffering its own financial difficulties as the speculative real estate and stock market bubble began to falter. This was caused by foreign investors selling their stocks after the Bank Negara announced ceilings on lending to property sectors and the purchase of stocks and shares (Corsetti et al., 1998b). Indonesia's first serious problems surfaced in August 1997 when the Indonesian rupiah was floated and it came under immediate pressure from investors. By September, the currency was substantially depreciated, as the full extent of the economic situation of Indonesia became known.

Corsetti et al (1998b) indicates that countries that had similar economic fundamentals and export structures to Thailand came under speculative currency attacks by traders even before the full extent of the situation had become known. For example, one of the reasons why the Philippines came under substantial attack from currency traders was because their export structure resembled Thailand's. The local currency, the peso was substantially devalued during this time. In fact, the Philippines' economic fundamentals were stronger than Thailand's, hence the impact of the crisis was less pronounced. As the year progressed, all currencies came under attack and experienced falls. Political uncertainty and the loss of government credibility in the Philippines, Thailand, Indonesia and South Korea resulted in the further withdrawal of foreign investors' funds.

The battered governments of the affected economies came under more pressure as they sought assistance from the IMF in a bid to restore confidence. Foreign investors accelerated the outflow of capital, as IMF intervention outlined the seriousness of the crisis (Radelet and Sachs, 1998). The withdrawal of foreign capital resulted in a vicious circle of currency depreciations as locals reacted by attempting to cover their risks by converting local currencies into US dollars. Corden (1998) explains that many firms and banks borrowed in unhedged dollars as they expected the exchange rate to remain fixed. The withdrawal of funds created liquidity problems, resulting in interest rates rising sharply. Higher interest rates caused an increase in the number of non-performing loans and affected the profitability of many firms who were previously unaffected by the crisis.

The financial crisis may have been avoided (at least in some countries) had the government and the IMF reacted faster to implement better economic management techniques. However, many believe the situation was initially made worse by IMF intervention when they required the affected countries to tighten fiscal and monetary policy as a prerequisite for assistance. With private investment falling, the implemented IMF reforms resulted in higher interest rates (with investments falling

further) and a fiscal contraction, which lowered aggregate demand even further. The IMF was then forced to respond quickly by modifying fiscal conditions.

The combined effects of the devaluations of the five economies most severely affected by the crisis had a negative impact on other Asian economies. For example, as the crisis intensified and threatened to spread, the Hong Kong dollar came under attack (in November) as a result of currency depreciations in the rest of Asia and the consequent loss of trade competitiveness in Hong Kong itself (Radelet and Sachs, 1999). Foreign traders anticipated that Hong Kong would devalue their dollar (changing its fixed peg to the US dollar) especially in light of the devaluation of Taiwan's dollar; however, this did not occur. The Singaporean dollar was also devalued (even though Singapore was a strong open economy) in line with the depreciation of the Malaysian ringgit due to Singapore's close proximity and trading arrangements with Malaysia.

## **RECOVERY**

It is difficult to ascertain how long it will take for the region to recover from the recent crisis. Corden (1998) draws on lessons from Mexico, particularly in relation to Thailand because of the similarities, as both countries had fixed exchange rates combined with very high capital inflows and current account deficits. Mexico took three years to recover from its economic and financial problems. It could therefore be expected that the countries most affected will take a similar period of time to recover. The length of the crisis will also be dependent on countries following the advice and recommendations of the IMF and the World Bank. Corden (1998) conceives that the problem facing Asian communities affected by the crisis in the short term (which looks like lasting three years) is that everything will hinge on when the export boom begins.

The economies that suffered from the first wave of financial crisis appear to have weathered the worst of the crisis. Their economies seem to have hit rock bottom. The speed of recovery from the crisis will differ for each country and will depend on the impact of the crisis, the structural reform processes undertaken and the implementation of policies used to help the economy recover. Economic indicators suggest that the South Korean economy is showing signs of recovery, while other countries are still in the midst of recession. Each affected Asian country is examined below to see how the recovery process has been proceeding.

Thailand was the first economy to suffer from the crisis, with the massive devaluation of the baht and capital outflow. The economy has begun to show signs of stabilisation with the IMF (1999) having outlined that the exchange rate has strengthened allowing further declines in interest rates to well below pre-crisis levels. The government has used expansionary fiscal policy to stimulate economic growth through lower taxes, increased transfer payments and labour intensive investment projects. The IMF (1999) has forecast that the Thai economy would record economic growth of one per cent in 1999 and a further increase of three per cent in 2000. The Treasury (1999) states that it has been investment rather than consumption or external stimulus that has provided for a return to economic growth.

In South Korea, economic recovery continues to strengthen with GDP forecast to grow by two per cent in 1999 and stronger growth in 2000 of 4.6 per cent (IMF, 1999). The recovery in South Korea has been fostered by financial stabilisation and easier macroeconomic policies, as well as recovery in investor confidence (IMF, 1999). South Korea has implemented structural reforms to the banking system and to the corporate sectors in a bid to remove those aspects that led to instability during the crisis. This has meant removing governmental favours in the contracting process to companies that had close links to government officials.

Indonesia's economic recovery continues to be hampered by political and economic unrest. The speed of stabilisation is behind that of Thailand and South Korea, as the government is required to maintain high real interest rates in order to stabilise the exchange rate (IMF, 1998). In recent times the exchange rate has stabilised and has appreciated against the Australian dollar as it approaches pre-crisis levels. The government has focused on expansionary fiscal policy to stimulate the economy and has been reasonably successful with the economy showing signs of recovery. While this recent growth is strong, it is coming off a low base, and the economy has some way to go before it reaches the level of activity experienced pre-crisis (The Treasury, 1999).

The Malaysian economy continues to show signs of economic recovery with the IMF (1999) forecasting that the economy will grow by one per cent in 1999 and two per cent in 2000. Despite stimulative monetary and fiscal measures introduced last year, however, domestic demand is expected to strengthen only gradually, and inflationary pressures are expected to remain low (IMF, 1999). External demand is the main source of economic recovery as private investment (domestic) has been slow to recover due to financial restructuring.

Finally, the country least severely affected by the financial crisis, the Philippines, should continue to recover on the back of modest growth. The Philippines has reduced interest rates slowly as the exchange rate has stabilised. The Philippine government was unable to utilise expansionary fiscal policy due to the high public debt to GDP ratio and this hampered the stabilisation of the economy.

## **IMPACT ON AUSTRALIA**

There are two major ways the financial crisis impacted on the Australian economy—through export performance and inbound tourism. The reduced purchasing power of the population of affected Asian countries has been reflected in both export volumes and their ability to travel.

The financial crisis initially affected the region's financial markets; however, it moved quickly to affect the real economy and the level of economic growth in the region. Significant currency depreciations led to rapid inflation in the Asian economies, making imports more expensive compared to domestically produced products. Australia, due to its strong trade links in Asia, was affected through lower exports into the region as examined in Part B of this study. For example, in Malaysia, exports fell from 17 500 tonnes in 1997 to 12 200 tonnes in 1998 in response to unfavourable economic conditions. The main effect of the fall in Australian exports

should flow through to Australia's current account balance. The fall in exports, if not counteracted by an increase in exports to other parts of the world, may eventually affect Australia's aggregate demand. For example, Australia's balance on current account deteriorated in 1997–98 to a \$A 23 billion deficit from \$A 18 billion in 1996–97 (ABS, 1999). A proportion of the rise in the current account deficit can be attributed to the fall in exports to Asia. The five countries most severely affected by the crisis accounted for approximately 20 per cent of Australia's total exports in 1996–97, and were expanding rapidly (DISR, 1998).

Australia's primary export in the service sector, tourism, has been significantly affected by the crisis. In 1997, Asian visitors accounted for almost half of all visitor arrivals to Australia (Office of National Tourism, 1998). Visitor arrivals from Asia during 1998 fell by 20 per cent as the effects of the crisis began to take hold (TFC, 1999). It is evident that the crisis has had an impact on the Australian economy, primarily through exports and inbound tourism, and this is likely to continue while the economic instability in Asia continues.

Australia's economy will strengthen as the Asian countries that were affected by the crisis begin to recover. Initially, Australia's competitiveness in the region was helped by the Australian dollar appreciating less than its US and European counterparts, making our goods less expensive in the Asian region. As each of the Asian countries recover, they have seen their exchange rate stabilise and appreciate against the Australian dollar. This has made Australian exports both cheaper and more competitively priced against domestic counterparts. However, consumer confidence has still not recovered completely in many of the Asian countries and purchasing power in some countries is likely to remain low, thereby limiting the recovery of exports from Australia.

Exports of infrastructure-related commodities from Australia should recover as Asian countries implement fiscal policy measures to stabilise their economies through infrastructure investment projects. Finally, inbound tourism numbers should recover during 1999 and 2000 as Asian currencies appreciate against the Australian dollar, increasing the ability of people to travel abroad. This increased demand should stimulate an increase in seat capacity in the marketplace. The TFC forecasts (1999) have estimated that visitor numbers from Asia will recover in 1999 (increasing by 4.2 per cent) before recovering further in 2000 (13.4 per cent).

Overall, the Australian economy managed to escape the major adverse consequences of the crisis. The main impact for Australia so far has been limited to exports and tourism, which while seriously affected, do not appear too bad in light of the circumstances facing neighbouring countries. It will undoubtedly take some time for Australian exports and tourism to fully recover. The pace of this recovery is largely dictated by factors in the Asian countries affected and are outside Australian control.



**APPENDIX V THE DELAY-INDUCING EFFECTS OF INCREASING CARGO-HOLD UTILISATION LEVELS**

American academics Douglas and Miller (1974) published a seminal piece of work on the effects of deregulation in the US domestic aviation market. Among their contributions to the debate concerning the pros and cons of the then recent deregulation policy, was a model they developed to assess the effect on schedule delay<sup>63</sup> caused by a combination of increasing airline passenger load factors and the changing frequency of flights in particular markets.

Their model (summarised below) was developed to explain passenger markets, and it was calibrated with US data sets. However, the mathematics on which it is based, and the implications that can be drawn from it, are also broadly applicable to Australian air freight markets.

The model takes the following form:

Schedule delay = Frequency delay + Stochastic delay

Where  $\text{Frequency Delay} = 92 \times F^{-1.456}$   
 $\text{Stochastic Delay} = 0.455 \times (Y^{-0.645}) \times (X^{-1.79}) \times I$

- Where F = the daily flight frequency (total flights per qtr / days in qtr)
- Y = the ratio of flight demand mean to its standard deviation (mean passengers per flight / (4.12 x square root of mean passengers per flight))
- X = relative capacity (mean aircraft capacity - mean passengers per flight) / (4.12 \* square root of mean passengers per flight), and
- I = the average interval between flights (total available scheduled time per qtr / total flights per qtr).

In simple terms, the model describes schedule delay in an aviation market as the average amount of waiting time between when a desired booking would take place and the time it is realised, as a function of average flight frequency and average load factor. As flight frequency increases (with all other variables held constant) frequency delay decreases. As load factor increases (with all other variables held constant) stochastic (or random) delay increases. The principles broadly apply

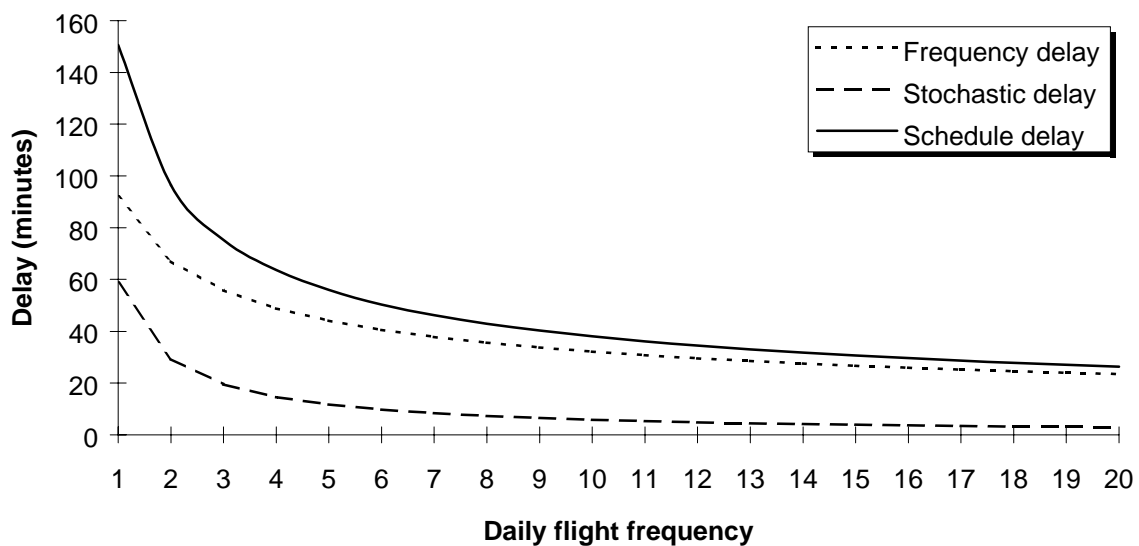
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<sup>63</sup> Schedule delay is explained in greater detail in this appendix, but in essence refers to the expected time difference between *when* a passenger would ideally like to fly and *when* a seat is actually available.

whether the schedule delay is occurring in an airline seat market or an airline cargo space market.

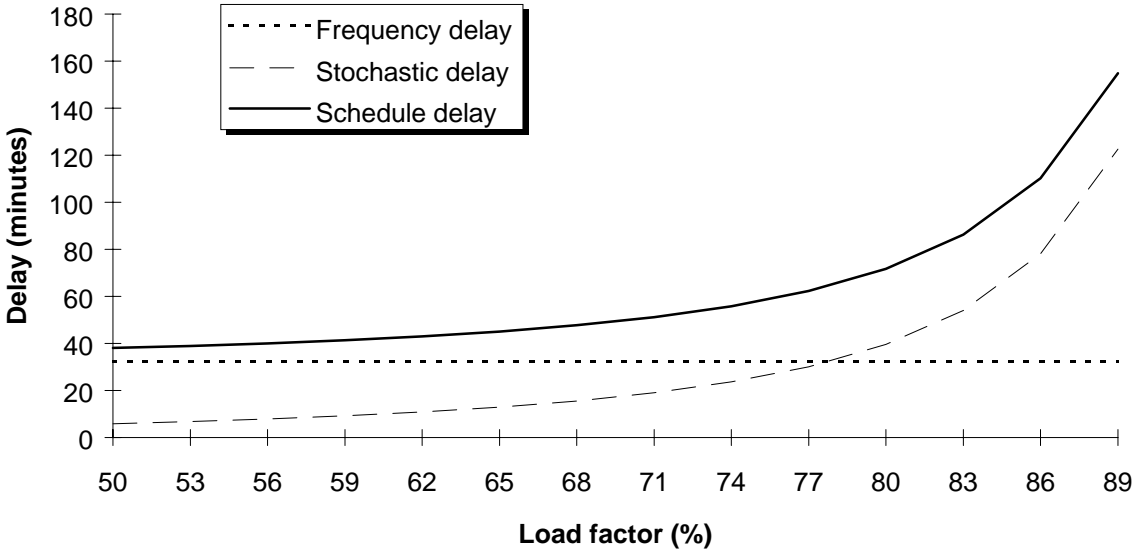
What is noteworthy from the perspective of this particular research, is not so much that the rate of change in schedule delay resulting from flight frequency increase is represented by a logarithmic decline (figure 57), but that schedule delay increases exponentially as load factor rises (figure 58). Load factor from an air freight perspective can be thought of as average cargo hold utilisation. In other words, in a market where the average ‘available cargo hold’ utilisation is close to 85 to 90 per cent, it is likely that freight forwarders would find it increasingly difficult to obtain aircraft hold space—certainly at short notice. In the country analyses in part B of this study, instances have been flagged where cargo hold utilisation appears to be approaching 90 per cent as potential problem areas for freight forwarders.

**FIGURE 57 VARIATION IN SCHEDULE DELAY (AND ITS COMPONENTS) HOLDING LOAD FACTOR CONSTANT AT 50 PER CENT AND VARYING DAILY FLIGHT FREQUENCY**



Source BTE estimates.

**FIGURE 58 VARIATION IN SCHEDULE DELAY (AND ITS COMPONENTS) HOLDING DAILY FLIGHT FREQUENCY CONSTANT AT 10 FLIGHTS PER DAY AND VARYING LOAD FACTOR**



Source BTE estimates.



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## **ABBREVIATIONS**

ABS	Australian Bureau of Statistics
ADP	Automatic Data Processing
BTCE	Bureau of Transport and Communications Economics
BTE	Bureau of Transport Economics
DOC	Direct Operating Cost
DoTRS	Department of Transport and Regional Services
EDI	Electronic Data Interchange
FTK	Freight Tonne Kilometre
GDP	Gross Domestic Product
IMF	International Monetary Fund
OD	Origin–Destination
TFC	Tourism Forecasting Council
UD	Uplift–Discharge
UPS	United Parcel Service

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