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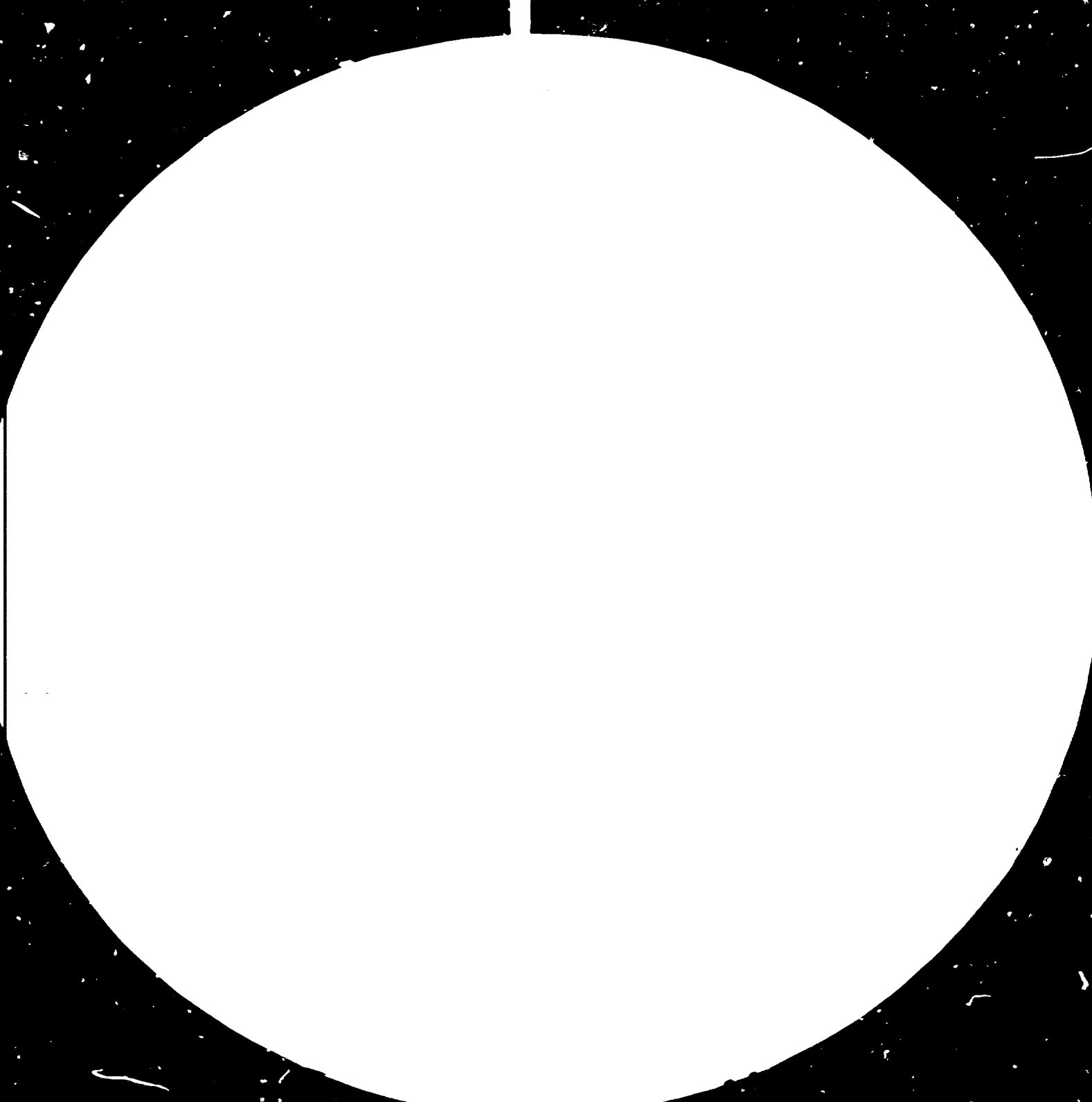

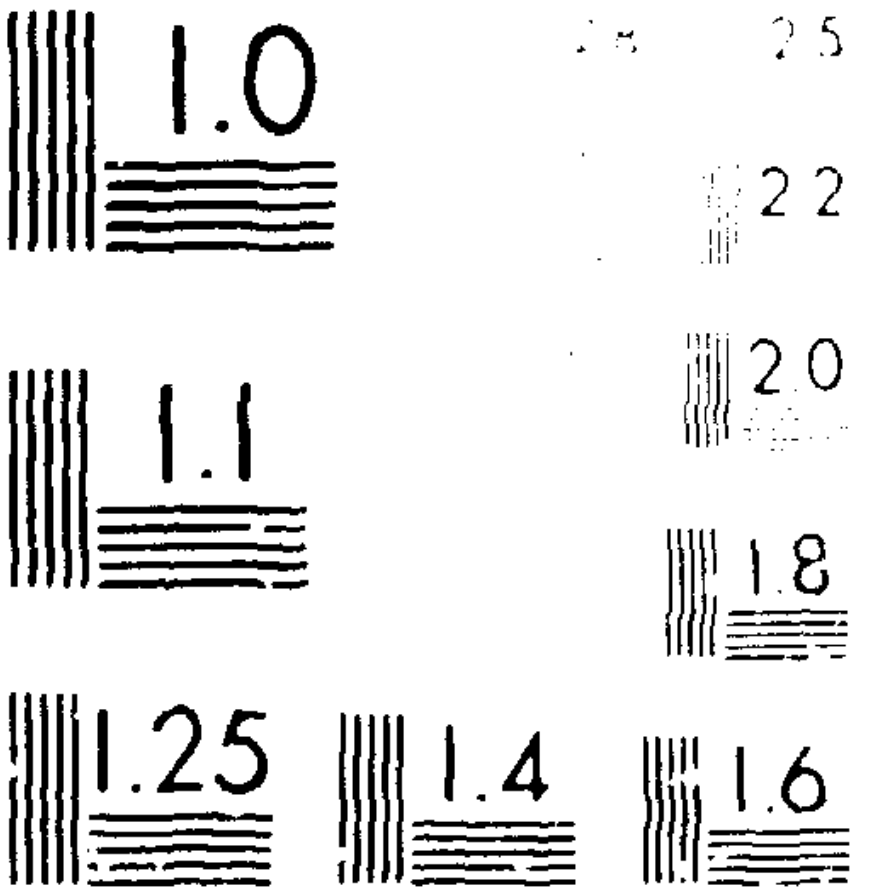
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THE STRUCTURE OF AUSTRALIAN INDUSTRY - PAST DEVELOPMENTS AND FUTURE TRENDS*

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PREFACE

In recent years there has been an increasing concern and awareness both nationally and internationally of the process of structural change and the implications of future structural change for employment, trade and development. This concern was stimulated by the world-wide downturn in economic activity and employment experienced since the mid 1970s.

This study is one of a series in UNIDO's research programme on industrial redeployment and restructuring. These studies aim to identify trends in the industrial restructuring process and to analyse the implications of and prospects for industrial redeployment to the developing countries within the changing international division of labour. The information provided by the studies should assist in providing a basis on which to conceive policies conducive to non-disruptive structural adjustment and co-operation between developed and developing countries.

The study examines the changing structure of Australian industry focussing on past developments and likely future trends. The study was carried out by the Australian Bureau of Industry Economics, Canberra. The research was carried out by Robert McKeon and Roman Domanski, under the supervision of Mike Fitzpatrick, Assistant Director of the Bureau. The study is a contribution in kind by the Australian government to UNIDO's programme of research. This contribution is gratefully acknowledged. It should be noted the findings in the study are not necessarily an expression of official government views.

The report begins with an introduction and summary of the implications and conclusions. Chapter 1 follows with a brief analysis of Australia's recent economic performance and broad changes in the structure of Australian industry. This chapter also includes an examination of expected global economic trends.

Chapters 2 to 5 assess the possible impact of factors that have had, or are likely to have, an important influence on structural change in the Australian economy over the next decade. These pressures include changes in the size and composition of the population and labour force, technological developments, overseas trade pressures, changes in the incomes and preferences of households, increases in wages and earnings, changes in investment patterns and government policies and industrialization in Asia.

Having assessed the likely impact of these pressures on Australian industry in isolation from each other, this information is brought together in Chapter 6 using a general equilibrium model of the Australian economy. This provides a consistent picture of a possible structure of the economy in the year 1990-1991. No attempt is made to trace the dynamic development of this projected industrial structure over the next decade.

In Chapter 7 an assessment of the predicted industrial structure is made taking into account a number unmodelled factors. In addition, an examination of the implications of this structure for economic policy is undertaken. This discussion draws heavily on sensitivity tests of the general equilibrium results which are presented separately in Appendix 2.

INTRODUCTION AND SUMMARY

This report arises from the widespread interest currently being shown in Australia's industrial development. This interest stems largely from two different sources. On the international side the world wide downturn in economic activity experienced since the mid 1970s has stimulated concern regarding future levels of world employment, trade and output. On the domestic front this pessimism is balanced by the healthy prospects for Australian industry arising from our strong minerals and energy position.

Past and future pressures for structural change in the domestic economy are investigated and this information is then used to derive a possible picture of the structure of the Australian economy in the year 1990-1991. It is shown that in contrast to the expectations of many other developed countries, Australia has the potential to undergo a substantial improvement in its economic performance over the next decade.

Summary of findings

In order to place the analysis of structural change in the domestic economy into broad perspective, Chapter 1 provides a brief overview of recent developments in the Australian and world economies.

It is noted that while the recent changes in the sectoral composition of Australian industry have taken place within the context of the post 1974 recession, the broad trends were already apparent by the early 1970s. The main feature of this changing sectoral composition was the increasing share of GDP enjoyed by both the mining and service sectors at the expense of the manufacturing and agricultural sectors. These changes were to a large extent also reflected in trade patterns, principally as a result of the strong growth experienced in the mining exports, and the continued concentration of imports in the manufacturing sector. There have also been marked changes in the direction of overseas trade. With regard to both exports and imports the most important changes were found to be the decline in the relative importance of Western Europe and the USA, and the increased importance of Japan, the developing Asian economies and the Middle East.

It is also noted in Chapter 1 that following the recession in world output and trade only a mild recovery is expected over the coming decade and that such an outcome would be likely to impinge on economic recovery in Australia. Offsetting this to some extent however is the expected strong growth in trade and output by the developing Asian countries. These countries have been able to maintain high real growth rates in both trade and output in spite of the world recession and a continuation of these broad trends is likely.

The next four chapters provide insights into a number of factors that are crucial to a determination of longer term development, viz: demographic factors, investment, industrialization in Asia, technological change and international trade.

In Chapter 2 projections of the Australian population are made to 1990-1991. These reveal that population growth can be expected to decline until about 1986 and then stabilize at between 0.8 and 1.1 per cent per annum depending on the assumptions regarding net immigration. The forecasts also show that the Australian population is likely to assume a more aged structure over the coming decade. Forecasts on household types reveal that there is likely to be a move towards smaller household groups during this period.

The projections on likely changes in the labour force to 1991 show that positive growth is likely over the period, albeit at a lower rate than prevailed throughout the 1970s. The decline in the rate of population growth will lead to a decline in the rate of growth of the labour force. However, both the increase in the proportion of the population of employable age and continued increases in female participation rates, especially those of married women, will act to temper the extent of this decline. This latter effect reflects increased job opportunities for females due to both technical change increasing the stock of jobs for women and the continued growth of the service sector. At the same time, there are also likely to be significant increases in the number of women seeking work, as social attitudes to female employment continue to liberalize and as child bearing patterns change.

Chapter 2 also notes that technological change will be an important determinant of the development, growth, and diversification of Australia's future industrial structure. Trends in the rate of technological change were examined on a sectoral basis. This examination showed that although technical progress would be important economy wide, it was likely to have most impact on the service and manufacturing sectors. The use of micro-electronics will become more sophisticated and widespread in a number of service industries and the services produced per person employed in the sector will substantially increase. With regard to manufacturing, it is felt that over the next ten years, most manufacuring industries will undergo a similar rate of technological change to that which has occurred in the past and achieve similar rates of productivity growth. Technological change in this sector will be concentrated on the application of micro-electronic techniques, product improvements and the attainment of greater economies of scale. The prospects for productivity improvements in the mining and agricultural industries were found to be weaker. The greatest productivity gains in the agricultural sector are expected to come from the use of bigger and more sophisticated machines and the farming of larger properties, although no change in the general types of equipment is expected. Productivity in the mining sector is expected to remain high though only slight improvements in the current level of productivity gains through technological change are expected over the next ten years.

Finally, Chapter 2 seeks to examine the role of investment in Australian industrial development. The analysis commenced with a brief examination of past and likely future developments in the pattern of investment expenditure in Australia. It is noted that future private investment is likely to be high in the mining and energy sector and in certain manufacturing activities, especially in the aluminium, petroleum, and coal products industries. The potential for future investment should be strongest in exporting industries.

The effect of energy conservation and environment protection will be an important feature of future investment patterns. In relation to environmental constraints, while it is recognized that investment in this area will increasingly divert funds from productivity increasing projects, it is assumed that this effect will be relatively small compared to many other industrialized countries. The impact of rising fuel costs is more complex. Australia's strong energy base will act to stimulate investment and economic development, whereas the need for energy conservation will require increased investment in the development of fuel efficient production processes and substitutes for oil and may retard economic development.

Most of Australia's investment has traditionally been financed from a high level of domestic savings, although foreign investment has also played a vital role as savings have been unable to match total investment needs. Possible reasons for this were identified as the absence of a national stock exchange, government financial regulations, the preference of small investors for debentures and note issue, and the high proportion of savings deposits lodged with savings banks and building societies. It was also noted however, that even if some of these factors were to change, substantial foreign investment would still be needed to help finance the high levels of capital formation expected in Australia in the 1980s.

Significant changes have occurred in the sources and direction of foreign capital inflow into Australia. While the major contributors to capital inflow have remained the UK and US, the proportion of funds coming from the UK has declined, while Japan and the EEC have both increased their share. As for the distribution of foreign investment in the economy this has, by and large, mirrored economic development within Australia, especially the growth in minerals and energy products and differential performance in manufacturing industries. Substantial foreign investment is expected in mining and minerals processing industries over the next ten years.

Foreign investment by Australians is small compared to foreign investment into Australia. A large proportion of this capital outflow is centred on New Zealand and Papua New Guinea and since 1973-1974 a large amount of Australian investment abroad has also gone to ASEAN. Recent trends in the sources and direction of foreign capital inflow and in foreign investment by Australians abroad are expected to continue over the next decade.

Chapter 3 provides a brief analysis of the role of the developing countries in Australia's industrial structure. Export led industrialization in Asia has provided an immediate source of pressure for structural adjustment particularly in the labour intensive industries. This is likely to continue over the next decade as the accumulation of human and physical capital, the international diffusion of new technology and escalating costs due to rising real incomes inevitably give rise to changes in the comparative advantage of a number of these developing Asian economies. The extent to which these changes in comparative advantage are translated into changes in the pattern of trade and the structure of industry, will determine the impact that the developing economies will have on future Australian industrial structures.

In the time period being considered, the most likely result of the impact of industrialization in Asia is that it will induce a movement of resources in Australia, out of the more labour intensive industries, for example, the textiles, clothing and footwear industries, into those industries making intensive use of capital, skilled labour and Australia's natural resources.

Chapter 4 looks at the position of exports. In the past, the composition of Australia's exports has traditionally been different from that observed in most other developed countries and has reflected the natural base underlying Australian comparative advantage with agricultural and more recently mining activities accounting for most of Australia's exports. It was noted that although recent growth in Australian exports has been in line with growth in world exports in all broad categories of commodities, Australia's share of world trade has declined. This decline was attributed to the small proportion of manufactured goods in total Australian exports compared to most other developed contries, as manufactures have represented the fastest growth in world trade. With regard to the direction of exports there has been a shift away from traditional markets in Europe towards Asia, particularly Japan and the developing Asian market economies.

A number of factors likely to affect the export performance of Australian industries were identified and discussed. On the external side Australia's export performance will be affected by the likelihood of only moderate improvements, compared to the recession experience of recent years, in growth in world trade. In addition, structural change and economic performance in Japan over the next decade are likely to restrain growth in Australian exports to that country, with the exception of energy goods. On the other hand, rapid industrialization in a number of Asian countries should generally enhance Australia's export prospects in those economies.

On the domestic front, it is suggested that the great difference between levels of assistance for import competing industries and for export industries has hindered the development of outward-looking export oriented manufacturing industries by encouraging industry to concentrate on production for the local market, rather than for export. During the 1970s however, awareness increased of the need for adjustment within the manufacturing sector to make it more competitive and export oriented. This awareness resulted in the instigation of government policies aimed at enhancing the development of export markets, increasing the efficiency of industries, reducing the level of import penetration and alleviating some of the adverse effects of structural change. It is noted that these policies have had a significant impact on the export orientation of the manufacturing sector with exports as a proportion of turnover having increased from 9 per cent in 1968-1969 to 17 per cent in 1978-1979.

On a more optimistic note it is suggested in Chapter 4 that the increasing real price of energy coupled with Australia's strong minerals and energy base will lead to rapid growth in exports of certain mining and manufactured commodities over the next decade.

The proportion of agricultural exports in total exports should continue to decline over the next decade. This should result from a continuation of the low growth in world agricultural trade and the protectionist policies regarding agricultural commodities in many of the industrialized countries. At the same time, however, some growth is expected in the East Asian, ASEAN and Middle East markets.

Determining export prospects for non-resource based manufacturing commodities is difficult, given the problems in identification of factor endowments used in the production of these commodities. Hence, the basis for long-term comparative advantage is not clear. However, it appears that export prospects for a number of non-resource based industries, especially where these are associated with labour-intensive production processes, are particularly weak. With respect to resource based manufacturing, the export prospects are judged to be strong, especially for processed mineral products.

Lastly, it is shown that exports of services are significant, but mainly concentrated in the transport and storage and wholesale and retail trade industries. It is noted that although exports of services will continue to account for a significant proportion of exports in 1990-1991, some decline in this share is likely. Tourism is identified as likely to provide a strong contribution to service sector export growth over the next decade.

In Chapter 5, the effects of imports and industry assistance policies on future structural change in the Australian economy are examined. Three major factors are identified as being likely to influence import penetration over the next decade.

An important determinant of future imports shares will be industry policy. Over the past decade considerable progress has been made in lowering the general level of protection. The average nominal rate of protection accorded manufacturing industry fell by 38 per cent from 1968-1969 to 1977-1978, while the average effective rate fell by 28 per cent over the same period. There are a number of reasons to suggest that further reductions in protection will be achieved over the coming decade. The government is committed to seek to achieve a less complicated tariff structure based on gradual progress towards lower and more stable levels in the past. This commitment is tempered by the adjustment pressures faced by industries and general economic conditions at the time. The opportunities for strong economic growth resulting from the resources boom may provide a suitable environment for a translation of this commitment into actual further achievement of reductions in protection over the next decade. In addition the government has requested the Industries Assistance Commission to investigate the possibility of further general reductions in the level of protection. It is suggested however that the commencement of such a programme is unlikely before the mid 1980s. Rather it is anticipated that the bulk of reductions over the next decade will come from industry specific decisions. In addition, the effects of other assistance measures on imports, such as policies aiming to increase the rate of technological progress, productivity improvement schemes and schemes aimed at increasing exports were also considered. Compared to protective measures, these are expected to have a less important influence on import shares, but should act to enhance the efficiency of Australian industry.

The second factor examined is changes in comparative advantage. The analysis reveals that pressures on those industries currently facing the most intense import competition are likely to continue. At the same time, however, it is observed that the newly industrializing countries of Asia will broaden their industrial base into more light and high technology industries, which may also place import pressures on those Australian industries in direct competition.

Finally it is argued that the strong prospects for export growth expected over the coming decade will simultaneously place added pressures on import competing industries.

Chapter 5 concludes with an attempt to identify those industries likely to be subject to increasing import pressure over the coming decade. This was achieved by using three different approaches. First, the likely change in the composition of exports from the developing Asian countries was analyzed. The second approach identified those industries that have been subject to significant and increasing import penetration over recent years. Finally a list was drawn up of manufacturing industries that are currently either the recipients of high levels of protection or have recourse to quantitative restrictions or special arrangements.

The analysis in the first five chapters does not specifically consider the interactive nature of economic activity and the importance of indirect effects. The remainder of the study seeks to overcome this problem by using SNAPSHOT, a long run general equilibrium model of the Australian economy, which aims to take specific account of economic relationships.

In Chapter 6 the model is used to generate a possible picture of the Australian industrial structure in the year 1990-1991. The first run is based on what were considered to be the most likely values of the exogenous variables; export levels, import penetration rates, employment etc. The model requires a large number of these exogenous variables and some specification problems were encountered. These problems necessitate that the results provided should be considered as only illustrative of the types of structural changes that are likely to take place.

The macro-economic projections show that Australia is likely to undergo a substantial improvement in its economic performance over the next decade. GDP is projected to grow at an average annual rate of 5.2 per cent over the period 1971-72 to 1990-1991, which is only slightly below the average annual rate of 5.5 per cent achieved over the period 1962-1963 to 1971-1972. Along with this increase in GDP, consumption and investment are also projected to have rapid growth over the SNAPSHOT period. GDP per person, consumption per person and the average real wage per employee are projected to grow at rates of 3.8, 4.4 and 3.5 per cent per annum respectively over the period 1971-1972 to 1990-1991.

The general impression conveyed by projections of the labour force is that there is unlikely to be any major change in the occupational structure over the period 1971-1972 to 1990-1991. The faster growing occupational categories are projected to be the skilled and professional groups, while the unskilled, rural workers, and armed forces groups all experienced below average growth.

The industry results provided under the base scenario, indicate that growth rates for all industries are expected to be positive and that differences between the rates of growth of industries are, in most cases, not great. The industries which will experience the fastest growth are those which are either expenditure elastic, make use of Australia's strong energy and mineral base or have strong export prospects. The industries with the lowest growth are generally those subject to high import competition or are expenditure inelastic. This aspect of the projections is in broad accord with the observations made in Chapters 4 and 5 regarding Australian comparative advantage, and those made in Chapter 2 about likely future investment patterns.

Chapter 7 provides an assessment of the projected Australian industrial structure. A number of difficulties that arise in any analysis of this kind are identified. For example, the analysis assume that the business cycle will be at neither trough nor peak in the year 1990-1991. Furthermore factors such as capital constraints, environmental considerations and industrial relations were not easily accommodated into any long term projection of the exogenous variables. It is argued that any extreme behaviour in any of the above or related factors could have a significant impact on the projection results.

A number of reasons are put forward to suggest that the prospects for economic growth over the 1980s are strong and that the degree of over-estimation of GDP and associated macro-economic parameters suggested in Chapter 6 is unlikely to be large. With regard to investment it is acknowledged that the investment/GDP ratio contained in the base scenario is likely to prove to be underestimated. It is suggested that this underestimation is the result of the inadequate handling of the impact of the rising real price of energy and environmental considerations within the model.

Turning to the industry results, it is shown that the base scenario results are robust with respect to changes in the assumptions regarding international trade and the level of unemployment but more sensitive to the assumed rate of technological change. Should there be delays in adopting the technologies assumed in the analysis all industries will [illegible]ence a fall in their growth rates, with different impacts across [illegible]s. Those industries which are likely to be most affected are [illegible]y import competing or labour intensive exporting and service industries.

With regard to the projections of labour demand, it is noted that these results are unresponsive to changes in all of the key underlying assumptions, and as such should provide an accurate picture of labour demand in 1990-1991. It is further noted that although there will be a need over the next decade for a gradual upgrading of skills this should be possible without significant real increases in educational expenditure.

Implications

This report deals with the potential for Australia's economic growth rather than with precise estimates of this growth. Economic performance is influenced by the interaction of a large number of factors, many of which cannot be predicted with competence or easily incorporated into formal economic analysis. Only one possible scenario of technology, trade, employment, etc. has been examined in detail, albeit one based upon the best information available. The actual levels of factors during the 1980s will undoubtedly yield growth rates somewhat different to those foreshadowed in this report. However tests on the sensitivity of the detailed analysis to variations in key assumptions confirmed the robustness of the results which form the foundations of this report.

The analysis abstracts from the dynamic process of the structural change and the report has little to say regarding the short term problems such as inflationary pressures, skill shortages, regional imbalances and adjustment to technological change. All of these will have an important bearing on the actual level of economic activity in 1990-1991 and it is important that shorter term problems be overcome as soon as possible. However it is equally as important that full account be taken of the long run consequences of any remedial measures taken to overcome these problems. Care must be taken to avoid the introduction of unnecessary rigidities which prevent the achievement of the long run possibilties.

The main message to come from this report is that Australia has the potential over the next decade to improve significantly its current economic performance; growth rates similar to those of the 1960s could be achievable. The expected trends in demographic, technological and trade pressures all push in this direction. In addition, the rising real price of energy coupled with Australia's strong minerals and energy base should act to place Australia's rate of economic growth at the forefront of western developed country's growth rates.

World economic developments will continue to exert a strong influence on Australian growth and many of these developments such as the world recession and energy prices are beyond Australian control. In some areas though Australia can have and should strive to have an impact. Pressure should continue to be exerted to gain reductions in overseas protection levels, particularly for agricultural products, to ensure continued growth in exports of these commodities. On the other hand, a possible stabilizing element on the international trade front is the development within the Asian region. Australia may be reliant upon export opportunities to this region to achieve the growth potential identified and it may be necessary to lower protection levels for some highly protected industries producing goods of export interest to those economies as soon as circumstances permit.

Foreign investment in Australia will play an important role over the next decade, especially in the establishment of new mining and mineral processing projects. These developments will provide considerable impetus to Australia's economic growth. The benefits and disadvantages of foreign investment are well known. The benefits include access to foreign markets and advanced levels of technology and sometimes foreign investment is the

only way to marshall the large amounts of capital necessary to bring potential developments to fruition. On the other hand they may lead to loss of control of national assets, and the possibility of conflicts between the national interest and those of the controlling organization. These disadvantages are especially relevant in the minerals area where international markets are frequently characterized by small numbers of large, often vertically integrated, firms. A balance is necessary then between the level of investment and ownership of assets to ensure that Australia achieves maximum benefit.

Turning to the domestic situation a significant component for growth is the expansion of the workforce due to the increase in the proportion of the population of employable age, increase in female participation rates and normal population growth. The sensitivity of the projected growth rate to changes in the assumed level of unemployment demonstrates the high cost to Australia of unemployment. This observation also suggests the urgent need to return to an environment characterized by low levels of inflation to enable reductions in unemployment to be sustainable.

One factor assisting the possible reduction in unemployment is that although substantial growth in the workforce is projected over the next decade this growth is lower than that experienced during the 1960s and early 1970s and so supply side pressures on unemployment are likely to subside gradually over the next decade.

A strong component of the growth in the labour force is the projected increasing female participation rates. This will act to reinforce the trend to part-time work and consideration will need to be given to rigidities in the current conditions and patterns of employment to take into account this emerging trend.

With regard to the structure of the workforce it is noted in the report that demand for labour will increase most rapidly in skilled occupational categories, though overall changes in the occupational structure of the workforce are likely to be small. Hence, there will be need over the next decade for a gradual upgrading of skills if Australia is to be able to exploit the areas of comparative advantage in its industrial structures. However, as this process will only be gradual, it is unlikely that pressures for substantial increases in educational spending and structural adjustment assistance will rise in the long-term. It is still possible however that short-run problems with the supply of labour will arise at certain points over the next decade. It is noted in Chapter 7 that the current high levels of unemployment have eroded the skill base of Australia's workforce and that there is evidence of supply shortages of certain types of skilled labour. If these difficulties persist they could provide a serious impediment to the achievement of the projected industrial structure. While it is possible that selective immigration can be used to offset these difficulties a more positive long run approach would be to reduce the level of unemployment and to have retraining schemes.

Another significant component of future growth is the projected level of technological change. This projected level is similar to the rate achieved during the 1960s and early 1970s when such change was accommodated within the economy with only minimal direct government intervention. As the report points to the potential of the economy to achieve economic growth rates similar to those experienced in this earlier period it is likely that the long-run problems of structural adjustment arising from technological change will not cause any serious disruption within the economy. Continued rapid rate of technological change brings with it advantages such as greater rates of economic growth and increased material living standards for the domestic population. Hence positive encouragement to technological development should be provided, accompanied by measures to deal with problems of short-run disruption. Though the report is not able to gauge the extent of likely short-run disruptions, the message that comes from this analysis is, that a policy to overcome these short-run disruptions by deliberately delaying the rate of technological change would be costly. Similarly a policy of selective delay in technological change in particular industries is also likely to be expensive as such an act will, as a consequence of the interdependence between industries, raise costs of other industries and reduce their international competitiveness and growth rates, and hence employment in these industries. A preferable approach would be to apply policies directed at reducing the disruptions resulting from this change such as providing short-term relocation and retraining assistance.

One theme central to this report is that much of the potential for growth in Australian economic activity will come from the development of Australia's strong mineral and energy base, and the associated growth of mineral processing manufacturing industries. The output from these industries will be directed to export markets and provides the basis for the projected strong growth in real exports over the coming decade. Whilst the increased exports will be partly matched by imports to facilitate further development of our mineral resources, the first round effect of the export oriented developments is expected to be a substantial improvement in Australia's current account. If adjustments are not made elsewhere in the economy the result will be higher rates of domestic inflation, leading to a loss of international competitiveness and much of the benefits of these new projects. Several options are available to reduce the size of the expected balance of payments surplus including exchange rate appreciation, tariff reductions, slowing the pace of investment, encouraging increased Australian investment overseas or increasing the efficiency of the domestic capital market. Each of these options carry implications for the domestic economy and may lead to short run disruptions. The choice of policy mixes therefore should depend upon the long term impact of such choice and any short run disruptions. The eventual outcome of these choices is beyond the scope of this report and cannot be predicted with confidence. However, it can be safely said that whichever choice is made there will be important feedbacks upon Australia's economic performance and industry structure during the next decade.

CHAPTER 1. THE AUSTRALIAN INDUSTRIAL STRUCTURE IN PERSPECTIVE

1.1 Introduction

This chapter is intended to place Australian industrial development into broad perspective by providing an overview of recent developments in the Australian and world economies. It develops a basis from which to view the recent past and likely future trends in Australia's industrial structure discussed in later chapters.

The chapter begins by tracing the path of some key economic variables over the last decade or so. These variables include growth in output, changes in the rates of unemployment and inflation, growth in wages and earnings and trends in profitability, investment and the external account. This is followed by a discussion of recent sectoral shifts in the Australian economy and developments in Australia's pattern of international trade. Australia, as a trading nation, is vitally affected by international economic developments and the chapter closes with a brief discussion of recent past and likely future developments in the world economy.

1.2 Current features of the Australian economy

Since 1974 there has been a slow-down in Australian economic growth coinciding with a similar decline in most OECD countries (Table 1.1). The average annual rate of growth in Australian gross domestic product declined from 4.9 per cent during the period 1963-1964 to 1973-1974 to 2.3 per cent during the period 1973-1974 to 1978-1979. A similar trend is also apparent in the growth of non-farm product, an indicator which abstracts from the considerable fluctuations that may occur from year to year in farm incomes. This declined from 5.9 per cent during the period 1963-1964 to 1973-1974 to 2.1 per cent during the period 1973-1974 to 1978-1979.

The decline in the rate of growth of the Australian economy has been accompanied by an increase in the level of unemployment, reduced investment and profitability, and high levels of inflation.

During the 1960s the annual rate of inflation did not rise above 5 per cent. From 1970-1971, however, the Consumer Price Index started to accelerate, peaking in the March quarter of 1974-1975 at 17.6 per cent (Table 1.2). After 1974 the inflation rate fell more slowly than the OECD average (Table 1.1). In recent periods there has been a slight resurgence in the rate of inflation with the consumer price index rising by 10.7 per cent in 1979-1980 compared with an increase of only 8.8 per cent in 1978-1979 (Table 1.2).

Increases in average weekly wage rates during the early 1970s were significantly ahead of rises in the Consumer Price Index. Since 1976, however, this trend has generally been reversed with increases in the CPI exceeding increases in average weekly wage rates (see Table 1.2). This reversal coincided with a decision, in February 1976, by the Australian Conciliation and Arbitration Commission to index wages on a quarterly basis in line with movements in the Consumer Price Index. In the last few years, the pace of wage increases has slowed in line with decisions to pass on only part of the CPI increase to wages and a move from quarterly to half yearly wage indexation hearings.

In 1971 unemployment in Australia was well below the OECD average in percentage terms (see Table 1.1). Monthly average unemployment grew rapidly from 1.4 per cent of the labour force (31,000 persons) in 1973-1974 to 3.6 per cent (275,000 persons) in 1974-1975 and 6.1 per cent (404,000 persons) in 1979-1980.1/ Australia's rate of unemployment is now above the OECD average. There seems little likelihood of a quick reduction in the rate of unemployment to the low levels of the 1960s.

In terms of the breakdown of unemployment among major demographic groups there has been a tendency for the proportion of unemployment accounted for by young persons to increase. The actual unemployment rate for persons aged 15-19 has jumped from 4.1 per cent in May 1974 to 17.8 per cent in September 1980. In comparison, unemployment among adult males has increased from 1 per cent to 3.8 per cent and that of adult females from 1.9 per cent to 6.1 per cent in the same period. In September 1980 about 28 per cent of the numbers unemployed consisted of persons aged 15-19.2/

Despite the recession female employment has continued to grow, largely as a result of the increased employment of married women. In September 1980 the number of married women in paid employment was about 11 per cent greater than in February 1974. Total male employment, however, has shown much slower growth over this period.

Turning now to investment, between 1968-1969 and 1973-1974 private gross fixed capital expenditure in Australia increased at an average rate of 3.4 per cent per year at constant prices. However, from 1973-1974 to 1979-1980, it fell by an average of about 0.5 per cent per year. Public fixed capital expenditure has also declined in real terms in recent years. From a peak level of $5,819 million attained in 1975-1976 it declined to $5,310 million in 1979-1980. Over the eleven year period from 1968-1969 to 1979-1980 it increased in constant prices at an average annual rate of 1.4 per cent compared with a growth of 1.3 per cent per year in private gross fixed capital expenditure.

Recent trends in profitability of Australian companies can be assessed by examining the behaviour of the company profit share measured by the ratio of the gross operating surplus of company trading enterprises to the value of gross non-farm product at factor cost. During the four years 1968-1969 to 1972-1973 this figure averaged 17.7 per cent. From 1973-1974 this share began to fall and remained low over the entire period 1973-1974 to 1979-1980 averaging only 14.2 per cent. Despite some recent signs of an improvement in economic activity and in post-tax profits of many large companies this percentage still remains significantly below pre 1973-1974 levels and in 1979-1980 stood at only 13.8 per cent.

Within individual sectors there have been some significant changes in the profit share. In the mining sector, for example, between 1968-1969 and 1975-1976 the combined gross operating surplus of companies, public enterprises, and unincorporated enterprises rose significantly as a percentage of the industry's gross product at factor cost from 51.6 to 64.5 per cent. In the manufacturing sector, on the other hand, the profit share declined over the same period from 34.3 to 24.7 per cent.

Turning finally to Australia's balance of overseas payments, this has, over the last decade, been characterized by sharp swings in both the current and capital accounts.

In 1971-1972, as a result of soaring commodity prices and substantial capital inflow, Australia's balance of payments position was strengthened and stood at $1,473 million (equivalent to 3.9 per cent of GDP). This position was quickly reversed. Following a net appreciation of the Australian currency, a pick up in domestic economic activity, and a 25 per cent across-the-board tariff cut in July 1973, imports increased rapidly. This together with a sharp reduction in capital inflow resulted in a balance of payments deficit of $435 million in 1973-1974.

In September 1974 the Australian dollar was devalued by 12 per cent and the link with the US dollar discontinued. Thereafter the exchange rate was varied according to movements in a trade weighted average of the currencies of Australia's major trading partners.

Throughout the period 1973-1974 to 1978-1979, despite a number of devaluations the deficit on current account grew steadily more adverse, reaching $3,212 million or 3.2 per cent of GDP in 1978-1979. Improvements in commodity prices and favourable climatic conditions for rural output resulted in a strong increase in Australian exports in 1978-1979. By 1979-1980 the deficit on current account had fallen to $1,188 million.

Capital inflow increased over the period 1973-1974 to 1978-1979, offsetting to some extent this deficit on current account. This increase was partly attributable to increased government long-term borrowing particularly in 1977-1978 and 1978-1979, when this reached $1,518 million and $1,354 million respectively. Since 1976-1977 there has also been a resurgence of private capital inflow, reaching $1,805 million in 1978-1979.

1.3 Recent sectoral developments

Recent changes in the sectoral composition of Australian industry have taken place largely within the context of the post 1974 recession. However, the broad trends, such as the decline in manufacturing and agricultural shares and the growth in mining and service shares, were apparent before the early 1970s.

The decline in the relative importance of agriculture is a phenomenon which often accompanies economic development. Table 1.3 shows that between 1962-1963 and 1976-1977, the contribution of agriculture to gross product fell from 11.6 per cent to 5.5 per cent. Continued diminution in the importance of agriculture over the next decade is likely. The main contributory factors are the low income elasticity of demand for rural products in developed countries, lower rates of world population growth, international attitudes towards protecting domestic rural industries and, to a lesser extent, the changes in prices of agricultural commodities relative to other products. Domestically a continuation of both high levels of protection of manufacturing industries and the rapid growth in mining exports will also act to reduce the importance of agriculture by maintaining a higher exchange rate. Gregory (1976) for example, has estimated that the growth in mineral exports over the last decade has had an effect on rural exporting industries approximately equal to that of a doubling of the average tariff level.

Employment within the agricultural sector has declined along with the decline in the agricultural sector's share of gross domestic product. In addition, because of the factor endowment pattern in Australia and the institutional arrangements for wage fixing, technological progress in farming tends to be associated with a continued substitution of capital for labour, thus displacing labour and increasing the dependence on purchased capital inputs. Between 1968 and 1978 agriculture's share of total employment declined from 8.2 per cent to 5.9 per cent.

Turning to the manufacturing sector, Table 1.3 shows that from 1962-1963 to 1976-1977, the share of manufacturing in total gross product also experienced a decline. Between 1962-1963 and 1976-1977 the manufacturing sector's share of gross domestic product fell from 28.4 per cent to 22.9 per cent. The sector's share of employment declined from 25.0 per cent in 1968 to 19.9 per cent in 1978.

The recession of the mid and late 1970s has had a significant impact on the performance of Australian manufacturing. During the period 1968-1969 to 1973-1974 manufacturing output grew at an average rate of 4.3 per cent per year. However, it fell by 0.9 per cent a year between 1973-1974 and 1976-1977 (Table 1.5). Furthermore while manufacturing employment as a whole increased at an annual average rate of 1.1 per cent between 1968-1969 and 1973-1974 it declined by 3.1 per cent a year in the period 1973-1974 to 1978-1979 (Table 1.6). A detailed examination of some of the causes of these changes is contained in Appendix 1.

The principal structural changes that took place within the manufacturing sector between 1968-1969 and 1976-1977 are indicated in Table 1.5.3/ The three largest industries in 1975-1976 were food, beverages and tobacco products, chemicals, coal and petroleum products and other manufacturing and equipment. In 1976-1977 these industries contributed 46.3 per cent of the total gross product of manufacturing, compared with 44.4 per cent in 1968-1969.

Table 1.5 also shows the growth rates of gross product at constant prices for the period 1968-1969 to 1976-1977, as well as for the sub-periods 1968-1969 to 1973-1974 and 1973-1974 to 1976-1977. Economic activity was relatively high in the former period, while the latter period was one of deepening recession. Only the food, beverages and tobacco and chemicals, petroleum and coal products industries achieved positive growth in the period 1973-1974 to 1976-1977. Declines in net output were particularly marked in the textiles, clothing and footwear and fabricated metal products industries. All suffered declines in their average growth of net output of more than 4 per cent a year during this period. These industries declined from 15.8 per cent to 13.6 per cent of gross manufacturing product between 1968-1969 and 1976-1977. Over the period 1968-1969 to 1976-1977 the two fastest growing industries were miscellaneous manufacturing and chemicals, petroleum and coal products.

Table 1.6 shows changes in the structure of manufacturing employment. For most industries, employment increased prior to 1973-1974, but subsequently declined with the onset of the recession. The textiles, and clothing and footwear industries are an exception to this general pattern, since their employment was already falling during the period 1968-1969 to 1973-1974. This decline accelerated as a result of the recession, and employment in both industries fell by more than 5 per cent a year between 1973-1974 and 1978-1979.

Overall, manufacturing employment declined by 1.0 per cent per year between 1968-1969 and 1978-1979, while net output expanded at a rate of 2.3 per cent a year from 1968-1969 to 1976-1977. The growth in manufacturing productivity in this latter period was about 2.5 per cent a year, as measured by the change in gross product per person employed (Table 1.7). This increase is largely attributable to the above average growth of capital-intensive industries, such as chemicals, petroleum and coal products. Changes in labour productivity in individual manufacturing industries are shown in Table 1.7.4/ It can be seen that the two industries which have experienced major reductions in employment since 1968-1969, textiles and clothing and footwear, have had a relatively fast rate of growth in gross product per person employed. This in part reflects the exit from these industries of some firms which had below-average labour productivity. It also reflects the benefits of additional investment in more modern machinery and equipment of a labour-saving kind.

The other industries which have enjoyed above-average rates of growth in gross product per person employed are chemical, petroleum and coal products, paper, paper products and printing, non-metallic mineral products, and miscellaneous manufacturing. The first two industries are relatively capital-intensive, and this factor has probably contributed to their growth in labour productivity.

The employment and output changes which have occurred in the manufacturing sector are partly the outcome of changes in the level of protection and of increased import penetration. For many industries, the level of long-term assistance through the tariff has either remained stable or has declined since 1973. However, temporary assistance measures, mainly in the form of quantitative import restrictions, have been introduced since 1974-1975 for selected industries and have had the effect of slowing, at least temporarily, the employment loss in these industries.5/ The net result has been that the average effective rate of protection to manufacturing industry as a whole has remained at about the same level, comparing 1973-1974 with 1976-1977 6/, although substantial changes in protection have occurred in individual industries.

Imports have tended to capture a larger share of the domestic market for manufactured goods in recent years. Industries which have received additional assistance since 1974 through temporary import restrictions have been those particularly subject to increased levels of import penetration.

Some of the employment problems of the more highly protected industries are highlighted by the data in Table 1.8. The industries with minimal tariff levels of 27 per cent or more are generally labour-intensive and often consist of a relatively large proportion of small firms. However, their decline in employment growth is partly attributable to changing patterns of consumer expenditure and productivity increases as well as to their lack of competitiveness against imports.

Changes in the size, composition and rate of growth of the Australian population and workforce also help to explain sectoral trends in output and employment. In the post war years, a large intake of immigrants and a high birth rate provided the market opportunities for expansion of manufacturing. The same factors assisted the growth of the manufacturing workforce. However, with a slowing down in the rate of population growth in recent years there has been a corresponding reduction in the increase in consumer demand, with consequent effects on the growth of the manufacturing sector. These effects are examined in more detail in Chapter 2.

In contrast to the agricultural and manufacturing sectors, there has been a rapid growth of the tertiary sector's share of total output and employment. In 1962-1963 service industries as a whole accounted for about 54 per cent of gross domestic product at constant prices (Table 1.3). By 1976-1977 their share of GDP had risen to about 62 per cent. Particularly rapid expansion has occurred in community services, where the contribution to the value of final output rose from 6.8 per cent in 1968-1969 to 10.3 per cent in 1976-1977. In addition, finance, insurance, real estate and business services increased their contribution from 8.2 per cent to 10.3 per cent over this same period. As Table 1.4 shows, both these segments of the tertiary sector have also increased their share of total employment in recent years.

The growth in the output of services has been greater in the public sector than in the private sector, although both segments increased their proportion of gross product over the period 1966-1967 to 1975-1976 (Table 1.9).

A significant emerging pressure for structural adjustment in the tertiary sector relates to technological change. It is generally accepted that while the demand for services will continue to grow, labour productivity in the service industries will grow more rapidly than in the past, thereby slowing direct employment growth in that sector.

Although the mining sector's share of total output is still relatively small, the last decade has seen a substantial increase in this share, rising from 1.5 per cent in 1962-1963 to 4.0 per cent in 1976-1977 (Table 1.5). Growth in exports has been more dramatic. Over the six years 1964-1965 to 1970-1971 processed and unprocessed mining exports from Australia increased from 9 per cent to 26 per cent of total exports of Australian produce. In 1977-1978 these accounted for 31 per cent of total exports of Australian produce, with coal, iron ore and bauxite representing the principal export commodities in terms of value.7/

This rapid growth in mining production and exports has generated pressures for change in the Australian economy. Firstly, as mentioned previously, it has tended to strengthen the exchange rate and thereby has put pressure on the import-competing manufacturing industries and on the traditional rural export activities. Secondly, the growth in mining output has had a differential regional impact. In particular, two of the less populous Australian States, Western Australia and Queensland have benefitted from recent large-scale mineral developments.

All indications point to substantial growth in the Australian mining sector over the next decade, with exports providing the major impetus to further expansion. The main market for these exports is likely to remain Japan, although the developing Asian economies should account for an increasingly large share. The major growth will occur in the iron ore, aluminium/alumina and coal industries. Australia's abundance of such resources may also offer opportunities for domestic manufacturing, with an increase in processing activities being undertaken in Australia. This growth in exports of minerals is considered in greater detail in Chapter 3.

1.4 Changes in the direction and composition of trade

The pattern and direction of Australia's trade continues to change in response to pressures arising from shifts in comparative advantage and institutional factors in Australia and traditional export markets. The growth and development of the Japanese economy, the industrialization of the developing countries of Asia and Britain's entry into the EEC have all had a perceptible impact on Australia's trade flows. These developments are reflected in the data in Table 1.10 which show the changing pattern of exports and imports to and from these regions.

In recent years two interrelated factors have adversely affected Australia's trading prospects with the enlarged European Economic Community. These are the accession of the United Kingdom to the Community and the Common Agricultural Policy of the EEC.

Prior to the enlargement of the EEC in 1973, the UK was the predominant market among the nine current member countries for most Australian rural products. With its absorption into the EEC, the relative importance of the UK market to total Australian agricultural trade has declined significantly. The proportion of total Australian exports of rural origin going to the UK declined from about 12 per cent in 1971-1972 to 3 per cent in 1976 - 1977.8/

By far the most important reason for the decline in exports to the EEC is the Common Agricultural Policy. By maintaining prices for many agricultural products above international market levels, the policy has the effect of stimulating production within the community, discouraging consumption and generating surpluses which need to be either stockpiled or exported with the aid of further subsidies. Consequently, Australia's access to the EEC market as well as its competitive ability in third countries, is critically affected by the CAP. Although the impact of these changes has been felt initially by the agricultural sector, it clearly has wider implications for structural adjustment in Australian industry because of the interdependence between the sectors.

A significant development in the pattern of trade in recent years has been the increased import competition experienced by many manufacturing industries, particularly from the Asian region. The dominant influence in Australian imports from Asia is Japan, which provided 21.0 per cent of Australia's manufactured imports in 1975-1976.

In addition, the developing Asian economies9/ accounted, in that year, for 10.3 per cent of manufactured imports into Australia. These latter countries have been increasing their exports of clothing, footwear, textiles, wood products, furniture and other labour-intensive manufactures to Australia. A more detailed assessment of the significance of this growth for Australian industry is provided in Chapters 3 and 4.

Table 1.10 also points to the increased importance of Asian countries as a market for Australian exports of manufactured goods. In 1975-1976 Japan and the Asian developing countries took just over one-third of Australia's manufactured exports. In 1968-1969 the proportion had been less than one-quarter. Both the United States and the EEC countries have declined in relative importance as markets for exports of Australian manufactured goods during this period. The changing composition of Australian trade between 1968-1969 and 1975-1976 is summarized in Table 1.11.

The most significant change in the composition of Australia's exports has been a decline in the share of rural products from 33.4 per cent in 1968-1969 to 23.9 per cent in 1975-1976. This decline partly reflects the entry of the UK into the EEC in 1973. The Common Agricultural Policy of the EEC and depressed world markets for rural products. The relative decline in exports of rural products has been taken up by increased exports of minerals. The share of exports from the mining industry has increased significantly, almost doubling in the period 1968-1969 to 1975-1976.

Trade in manufactured goods has remained fairly stable over the period with their share of total exports falling slightly from 54.5 per cent to 52.7 per cent. The largest two manufacturing industries, in terms of exports, are food and beverages and basic metal products. Basic metal products increased their contribution to exports between 1968-1969 and 1975-1976, while the share of food and beverages decreased marginally over the period. Other industries to show small relative declines icluded textiles, fabricated metal products, transport equipment and manufacturing NEC, while other industries displaying some relative increase include chemicals, petroleum and coal products, and other machinery and equipment.

By 1975-1976 more than 92 per cent of Australia's imports consisted of manufactured goods. Three industries, other machinery and equipment, transport equipment, and chemicals, petroleum and coal products accounted for almost 57 per cent of total imports. Between 1968-1969 and 1975-1976 the share of imports increased significantly for other machinery and equipment, clothing and footwear, and chemicals, petroleum and coal products. Industries to experience a decline in their share of total imports included transport equipment, basic metal products and paper and paper products.

1.5 Growth in the world economy

Economic development in Australia cannot be treated in isolation from outcomes in the world in general. Accordingly, speculation about future economic structures must also take account of Australia's economic interdependence with the rest of the world. This section presents a brief examination of likely growth in the world economy and its implications for economic development over the coming decade.

During the 1970s the world economy was subjected to greater instability and structural change than for about four decades. The twin evils of high inflation and unemployment adversely affected growth, external balance and international trade. These problems were compounded by a more acute energy situation and consequential price hikes, especially in respect of oil. There is little sign of a substantial abatement in these problems for the short to medium term.

The OECD Interfutures Project10/ has recently provided some projections on the likely future growth in world output from 1975 to 1990. Table 1.12 provides details of these projections under three alternative Interfuture scenarios. This shows that world output is projected to grow at between 3.5 per cent and 4.8 per cent per annum. The most likely outcome is an intermediate growth rate, such as the 3.8 per cent per annum indicated by moderate growth scenario B2. This is well below the 5 per cent experienced in the post war period up to the onset of the recession in 1973.11/ It would also indicate only a mild recovery from the world recession experience of recent years. Between 1973 and 1978 world commodity output increased by an average of only 3.5 per cent per annum.13/

The OECD has recently pointed to the following factors as support for the proposition of only a moderate improvement in growth in world output over the next decade:14/

The high energy prices, raw material shortages and assertion of suppliers, particularly in respect of oil, experienced in recent years are unlikely to abate in the near future.

In recent years, there has been a world-wide trend towards increased protectionism.15/

The technology gap between the US and other industrial countries has diminished, thereby reducing some of the possiblities for future economies of scale and mass production. On the other hand, there are still immense possibilities for technology adaptation by the newly industrializing countries. This could result in enhanced productivity growth, not so much from the 'horizontal specialization' experience of the post-war years, but more from 'vertical specialization'.

The potential for labour shifting towards high productivity sectors has narrowed as a result of the diminution of low income generating production units and the consequent convergence of income levels. At the same time, employment has tended to shift to sectors which historically have experienced lower productivity growth (e.g. certain types of services). On the other hand, recent technological developments, may result in enhanced service sector productivity.

Finally, the recession has had a world wide depressing effect on R and D expenditure and investment. This would have slowed the rate of technological progress.

In addition, the problem of having full employment without inflation is unresolved, and that governments are likely to continue to fight inflation by running the economy at higher levels of unemployment and lower rates of economic growth than in the 1950s and 1960s.

An important facet of future growth in the world economy will be the growth of world trade. From 1955 to 1976 there was a tenfold increase in world trade expressed in current prices. This was accounted for by a thirteen fold increase in world trade in ores, matters and views and a fourteen fold increase in world trade in manufactures. Agricultural trade, on the other hand, showed a more modest increase.17/

Over the same period Australia's exports also increased rapidly, particularly in respect of mining and manufacturing products which increased at a faster rate than world trade in these products. However, Australia's share of world trade actually declined in the period 1955 to 1976. This decline can be explained by the composition of Australian exports. Manufactures - the largest growth area in world trade - represents a relatively small percentage of total Australian exports compared to the overall world level, while agricultural exports - which have shown a lower growth in world trade - account for a relatively large proportion of total Australian exports.

This preceding discussion on long term past trends in the growth of world trade, however, tends to obscure the more recent experience of the world economy. Since the onset of the recession in 1973, the growth of world trade has declined significantly compared to previous experience. There seems little reason to believe that growth in world trade will improve substantially over the next decade for much the same reasons as those advanced previously in respect of future world output.

The OECD Interfutures Project has forecast that under a moderate growth scenario, world trade will grow at about 6 per cent per annum in the period up to the year 2000. This is above the 4 per cent annual average rate of growth for the period 1973-1978, but below the pre-recession experience of nearly 9 per cent per annum between 1963-1973. Further trends to or away from trade liberalization would, of course, significantly influence this outcome.18/

One factor which needs further elucidation is the role of the developing economies in future world economic development. From Australia's viewpoint, it is particularly important to focus on the newly industrializing countries of Asia due to their proximity to Australia.

The proportion of world exports accounted for by the ASEAN bloc and four other Asian developing economies (China, Hong Kong, South Korea and Taiwan), rose from some 4 per cent in 1965, to nearly 7 per cent in 1976. For the ASEAN bloc the average annual rate of growth over this period expressed at current prices was 20.8 per cent, which compares with a world rate of 16.6 per cent. The countries in the Asian region with the most rapid growth in exports were the Republic of Korea, Island of Taiwan and Indonesia.

In terms of the future world economy, the fact that these nations experienced substantial growth in manufactured exports, especially to the developed countries, is particularly important. Between 1970 and 1976, the Republic of Korea's exports of manufactured goods increased tenfold, while for Singapore and Thailand the increase was thirteen fold.

To date exports of manufactures from these Asian economies have been mainly in labour intensive products. However as the BIE has previously noted, this may be expected to change somewhat:

> The comparative advantage of countries within the Asian region is changing as economies such as the Island of Taiwan, Singapore, and the Republic of Korea make changes in their industrial policies to adapt to rising wages and higher per capita incomes. Labour intensive manufacturing activities are shifting into countries such as Malaysia and Indonesia where labour is still relatively low priced. At the same time, the more advanced of the Asian developing economies are tending to place more emphasis on industries such as engineering products, transport equipment and scientific instruments, which rely on the application of higher levels of skill and technology. As these adjustments take place, there will be more diversity and sophistication in the products exported from the developing Asian countries.19/

Such changes should have a profound effect on the composition and direction of world trade. These developments indicate that there will be a greater possibility of vertical specialization between the industrialized nations and the new industrial economies. Kasper has pointed to the probability that:

> 'those countries which are prepared to produce the investment goods and capital-and skill-intensive industrial inputs for the new industrial countries will obtain the most pronounced growth impulses.'20/

As will be shown later in this report, Australia is well placed to provide a significant proportion of the material inputs necessary for continued industrialization in the developing Asian countries.

The projections shown in Table 1.12 emphasize the growing role of developing countries in the future world economy. Even under the low growth and moderate scenarios, which are associated with the tightening of protectionism currently being adopted on a global scale, the share of world output attributable to the developing countries is expected to rise, albeit only marginally from 22 per cent in 1975 to 23 per cent or 24 per cent in 1990. Under the high growth scenario, which assumes a more liberal international trading environment, the developing countries' share is expected to increase rapidly and reach 27 per cent of world output by 1990.

This examination of possible future developments in the world economy to 1990 is intended to provide some perspective with which to view Australia's economic development over the next decade. Some of the themes touched on here, will be analyzed in greater detail in later chapters in relation to their likely effects on certain key variables, such as the level of exports and imports.

Footnotes

1. Australian Bureau of Statistics, The Labour Force Australia Cat nos. 6202.0 and 6204.0.

2. Ibid.

3. Because of changes in the method of industry classification in 1968-1969, comparable data for earlier periods is not available.

4. The productivity estimates in Table 1.7 differ from those implied by Tables 1.5 and 1.6 due to the use of different industry employment data. Table 1.6 uses data obtained from a complete census of manufacturing establishments. Table 1.5 uses employment data obtained from various sources, and excludes self employed persons. Productivity growth rate estimates based on the manufacturing establishment's employment data closely reflects the changes in unit labour requirements.

5. Industries Assistance Commission, Annual Report 1978-1979, pp.7-9.

6. Ibid., Chapter 2 and Appendix 2.2.

7. Department of Trade and Resources, Economic Indicators, AGPS, Canberra, various issues.

8. Department of Trade and Resources, Australia's Pattern of Trade, various issues.

9. The developing Asian economies, as defined here, comprise the following East and South East Asian countries: Indonesia, Malaysia, the Philippines, Singapore, Thailand, People's Republic of China, Hong Kong, India, the Republic of Korea and the Island of Taiwan.

10. Organisation for Economic Co-operation and Development, (1979a).

11. This projection is in line with a number of other similar studies. See for example, Fels (1980).

12. Organisation for Economic Co-operation and Development, op.cit.

13. GATT (1980).

14. Organisation for Economic Co-operation and Development, (1979b).

15. Doubt is expressed in some quarters as to whether or not there has been a significant rise in protectionism. See, for example, Healey (1980).

16. Fels, op.cit., p.19.

17. Industries Assistance Commission, Annual Report 1978-1979, pp.3-4.

18. Organistation for Economic Co-operation and Development, (1979a).

19. Bureau of Industry Economics (1978), p.5.

20. Kasper, W. (1978a), p.18.

Table 1.1: Unemployment, consumer prices and gross domestic product, Australia and OECD countries, 1971 to 1978

	Rate of unemployment(b)		Percentage change from previous year			
			Consumer price index		Gross domestic product(c)	
	Australia	OECD(d)	Australia	OECD	Australia	OECD
1971	1.9	3.6(e)	6.1	5.3	5.4	3.7
1972	2.6	3.7(e)	5.8	4.9	3.0	5.5
1973	2.3	3.3	9.5	7.8	5.3	6.3
1974	2.6	3.5	15.1	13.5	2.6	0.7
1975	4.8	5.2	15.1	11.3	2.4	-0.5
1976	4.7	5.3	13.5	8.6	3.6	5.3
1977	5.6	5.2	12.3	8.9	0.9	3.7
1978	6.4	5.1	7.9	7.9	1.7	3.9

Source: Organisation for Economic Co-operation and Development, Economic Outlook, December 1980

Notes:
(a) Because of adjustments made by the OECD, the data shown for Australia may differ from those published by the ABS.
(b) Expressed as a percentage of the total labour force.
(c) Estimated in real terms by the OECD.
(d) Average unemployment rate in 12 major OECD countries, representing 90 per cent of total OECD labour force (see Source).
(e) OECD averages estimated by the Industries Assistance Commission.

Table 1.2: Quarterly price and wage developments, March 1973 to June 1980

	Consumer price index(a)	Weekly wage rates(b)
1973 March	5.7	10.7
June	8.2	15.0
September	10.6	15.1
December	13.2	14.7
1974 March	13.6	15.6
June	14.4	27.9
September	16.0	34.3
December	16.3	35.7
1975 March	17.6	34.8
June	16.9	18.4
September	12.1	15.2
December	14.0	11.7
1976 March	13.4	17.1
June	12.3	15.0
September	13.9	12.5
December	14.4	14.7
1977 March	13.6	12.2
June	13.4	11.0
September	13.1	10.9
December	9.3	10.2
1978 March	8.2	7.3
June	7.9	6.6
September	7.9	5.3
December	7.8	7.9
1979 March	8.2	6.4
June	8.8	8.2
September	9.2	7.6
December	10.0	4.9
1980 March	10.5	9.9
June	10.7	6.7

Source: Australian Bureau of Statistics, Consumer Price Indexes, various issues, No. 6401.0 and Wage Rate Indexes, various issues, No. 6311.0.

Notes: (a) Change on the corresponding period of the previous year of the ALL groups 6 state capital consumer price index.
(b) Annual change in the ALL Industry group weekly adult male wage rate.

Table 1.3: Shares in total gross product by industry, 1962-1963, 1968-1969, 1972-1973 and 1976-1977, at current prices(a)

Industry	1962-63	1968-69	1972-73	1976-77	Percentage point changes 1962-63 to 1968-69	Percentage point changes 1968-69 to 1976-77
	%	%	%	%		
Agriculture, forestry, fishing and hunting	11.6	9.1	7.7	5.5	-2.5	-3.6
Mining	1.5	2.1	3.3	4.0	+0.6	+1.9
Manufacturing	28.4	27.1	24.3	22.9	-1.3	-4.2
Electricity, gas and water	3.2	3.3	3.1	2.9	+0.1	-0.4
Construction	7.1	7.5	7.6	7.5	+0.4	0.0
Wholesale and retail	17.1	16.2	15.7	15.6	-0.9	-0.6
Transport and storage; communication	7.2	7.6	7.3	7.2	+0.4	-0.4
Finance, insurance, real estate and business services	7.0	8.3	9.8	10.3	+1.3	+2.0
Public administration and defence	3.1	3.6	4.0	4.5	+0.5	+0.9
Community services)		6.8	8.0	10.3)		+3.5
	9.1				+1.4	
Entertainment etc. and personal services(b))		3.7	3.8	4.1)		+0.4
Ownership of dwellings	5.2	5.5	6.2	6.7	+0.3	+1.2
Customs duties	1.3	1.3	1.2	1.4	0.0	+0.1
Less imputed bank service charge	-1.9	-2.1	-2.5	-2.6		
Total	100.0	100.0	100.0	100.0		

Source: Australian Bureau of Statistics, Australian National Accounts: Gross Product by Industry at Current and Constant Prices, Cat. No. 5211.0.

Notes: (a) The shares of industries in total gross product are calculated in current prices to avoid problems of interpretation associated with changing relative prices over time.
(b) Comprises entertainment, recreation, restaurants, hotels and personal services.

Table 1.4: Employment for selected industries, 1968, 1972, 1976 and 1978(a)

	1968	1972	1976	1978
	%	%	%	%
Agriculture	10.1	9.2	7.5	7.2
Manufacturing	27.0	26.3	24.8	22.8
Finance, insurance, real estate and business services	5.2	5.8	6.5	6.4
Community services	6.1	6.8	8.2	9.0
Contribution to total employment	48.4	48.1	47.0	45.4

Source: Australian Bureau of Statistics, The Labour Force, various issues, No. 6204.0.

Note: (a) Data on employment shares by industry is only available on a calendar year basis.

Table 1.5: Gross product by manufacturing sub-division, shares at current price, and growth rates at average 1974-1975 prices, 1968-1969, 1973-1974 and 1976-1977

Industry	ASIC sub-division code	Share of manufacturing gross product at current prices			Annual rates of growth at average 1968-69 prices		
		1968-69	1973-74	1976-77	1968-69 to 1973-74	1973-74 to 1976-77	1968-69 to 1976-77
		%	%	%	%	%	%
Food, beverages and tobacco	21, 22	22.0	21.6	23.1	2.8	2.3	2.6
Textiles	23	3.7	3.2	2.5	4.0	-5.2	0.4
Clothing and footwear	24	4.8	4.5	4.0	2.6	-6.4	-0.9
Wood, wood products and furniture	25	4.6	5.1	5.2	3.4	-1.3	1.6
Paper and paper products, printing	26	7.3	7.8	7.7	5.5	-0.4	3.3
Chemical, petroleum and coal products	27	10.5	11.5	11.9	7.4	0.1	4.6
Non-metallic mineral products	28	4.4	4.6	4.6	6.2	-0.4	3.7
Basic metal products	29	8.8	8.8	8.9	5.2	-2.2	2.4
Fabricated metal products	31	7.3	7.2	7.1	3.4	-4.7	0.3
Transport equipment	32	10.4	9.3	9.7	2.9	-1.0	1.4
Other machinery and equipment	33	11.9	11.4	10.6	3.6	-1.6	1.6
Miscellaneous manufacturing	34	4.4	5.0	4.6	8.4	-1.1	4.7
Total manufacturing		100.0	100.0	100.0	4.3	-0.9	2.3

Source: Australian Bureau of Statistics. Australian National Accounts, Gross Product by Industry at Current and Constant Prices, 1976 - 1977. Cat. No. 5211.0.

Table 1.6: Total employment by manufacturing(a) sub-division, share and annual rates of growth, 1968-1969, 1973-1974 and 1978-1979

Industry	ASIC sub-division code	Share of total employment 1968-69 %	1973-74 %	1978-79(a) %	Annual rates of growth 1968-69 to 1973-74 %	1973-74 to 1978-79 %	1968-69 to 1978-79 %
Food, beverages and tobacco	21, 22	14.7	15.3	16.4	2.0	-1.5	0.3
Textiles	23	4.7	4.1	3.2	-1.4	-7.8	-4.5
Clothing and footwear	24	9.7	8.2	7.0	-2.1	-5.9	-4.0
Wood, wood products and furniture	25	6.4	6.4	6.9	0.6	-2.8	-1.0
Paper and paper products, printing	26	8.1	8.1	8.6	1.2	-2.0	-0.3
Chemical, petroleum and coal products	27	5.1	5.0	5.3	1.0	-1.6	-0.2
Non-metallic mineral products	28	4.1	4.1	3.9	1.6	-3.9	-1.2
Basic metal products	29	7.0	7.3	7.7	2.2	-1.6	0.3
Fabricated metal products	31	8.9	8.9	9.4	1.1	-2.3	-0.6
Transport equipment	32	11.5	11.9	11.8	1.9	-3.0	-0.5
Other machinery and equipment	33	14.9	14.9	14.0	1.1	-4.3	-1.5
Miscellaneous manufacturing	34	5.2	5.9	5.8	3.7	-4.0	0.0
Total manufacturing ('000)		1261	1338	1168	-	-	-
(%)		100.0	100.0	100.0	1.1	-3.1	-1.0

Source: Australian Bureau of Statistics: Manufacturing Establishments. Detail of Operation by Industry Class, Australia. 1973 - 1974, 1975 - 1976. Cat. No. 8203.0, and Manufacturing Establishments: Summary of operation by Industry Class, 1976 - 1977, No. 8202.0.

Note: (a) All manufacturing establishments owned by multi-establishment enterprises and single establishment manufacturing enterprises with four or more persons employed - average over whole year plus single establishment manufacturing enterprises with less than four persons employed - end of June 1977.

Table 1.7: Gross product per person employed by manufacturing sub-division, at average 1974-1975 prices, 1968-1969, 1973-1974 and 1976-1977 (a)

Industry	ASIC sub-division code	Indexes (base 1974-1975 = 1000) 1968-69	1973-74	1976-77	Annual rates of growth 1968-69 to 1973-74	1973-74 to 1976-77	1968-69 to 1976-77
		%	%	%	%	%	%
Food, beverages and tobacco	21, 22	954	983	1059	0.6	2.5	1.3
Textiles	23	805	1019	1142	4.8	3.9	4.5
Clothing and footwear	24	856	1021	1052	3.6	1.0	2.6
Wood, wood products and furniture	25	983	1071	1045	1.7	-0.8	0.8
Paper, paper products, printing	26	838	1005	1082	3.7	2.5	3.2
Chemical, petroleum and coal products	27	781	1062	1124	6.3	1.9	4.7
Non-metallic mineral products	28	806	1032	1097	5.1	2.1	3.9
Basic metal products	29	865	1046	1001	3.9	-1.5	1.8
Fabricated metal products	31	1020	1081	1012	1.2	-2.2	-0.1
Transport equipment	32	929	978	1020	1.0	1.4	1.2
Other machinery and equipment	33	881	964	1045	1.8	2.7	2.2
Miscellaneous manufacturing	34	760	1014	1086	5.9	2.3	4.6
Total manufacturing		864	997	1049	2.9	1.7	2.5

Source: Australian Bureau of Statistics: Australian National Accounts. Gross Product by Industry at Current and Constant Prices 1977-1978. Cat. No. 5211.0

Note (a): See footnote 4 to this Chapter.

Table 1.8: Changes in employment in manufacturing, by industries classified by nominal tariff categories

Nominal tariff levels 1973-1974	Employment changes	1968-69 to 1975-76
%	Absolute ('000)	%
0 - 5	+3.7	+2.0
6 - 16	-5.4	-3.0
17 - 20	-7.7	-4.0
21 - 26	-9.6	-4.0
27 -31	-25.3	-8.0
32 -50	-21.6	-18.0

Source: Gregory (1978) Table 2.

Table 1.9: Gross product at factor cost, public and private services, 1966-67 and 1975-76, at current prices

	1966-67		1975-76	
	$ million	% of GDP at factor cost	$ million	% of GDP at factor cost
Private services	7 585	37.0	25 523	39.8
Public services	4 202	20.5	16 224	25.3
Gross domestic product at factor cost(a)	20 500		64 127	

Source: Estimated from Australian National Accounts by Department of Industry and Commerce.

Note: (a) Includes adjustments for ownership of dwellings by persons and bank service charge.

Table 1.10: Destination of Australian exports and origin of imports by sector, 1968-69 and 1975-76 (percentage of total)

		Imports			Exports		
		Rural	Mining	Manufacturing	Rural	Mining	Manufacturing
Developing Asia (a)	1968-69	28.0	21.6	4.6	12.9	2.2	14.6
	1975-76	34.6	1.3	10.3	15.5	3.7	17.3
Japan	1968-69	1.9	0.6	13.3	30.8	64.5	10.2
	1975-76	5.4	1.0	21.0	26.5	64.5	16.3
USA	1968-69	15.0	4.5	27.3	5.9	7.6	20.5
	1975-76	15.1	2.1	21.1	2.9	2.7	12.6
EEC	1968-69	6.1	1.2	38.1	33.3	17.6	21.9
	1975-76	7.2	0.9	29.0	16.0	15.1	11.3
Other	1968-69	49.0	72.1	16.7	17.2	8.1	32.8
	1975-76	37.7	94.7	18.6	39.1	14.1	42.5
Total	1968-69	100.0	100.0	100.0	100.0	100.0	100.0
	1975-76	100.0	100.0	100.0	100.0	100.0	100.0

Source: Adapted from Bureau of Industry Economics (1978), Tables A3.1 and A3.3.

Note: (a) The developing countries as defined here comprise Indonesia, Malaysia, the Philippines, Singapore, Thailand, the People's Republic of China, Hong Kong, India, South Korea and Taiwan.

Table 1.11: Composition of Australia's exports and imports by industry, 1968-69 and 1975-76 (percentage of total)

Industry	Exports		Imports	
	1968-69 (%)	1975-76 (%)	1968-69 (%)	1975-76 (%)
Agriculture	33.4	23.9	3.5	2.2
Mining	12.1	23.4	7.2	5.2
Manufacturing	54.5	52.7	89.3	92.6
of which:				
Food, beverages and tobacco	21.4	20.2	3.2	3.2
Textiles	2.9	1.6	7.6	6.7
Clothing and footwear	0.3	0.1	1.4	3.4
Wood, wood products etc.	0.3	0.7	1.8	2.2
Paper etc.	0.4	0.3	5.6	4.5
Chemical, petroleum and coal products	2.3	3.3	11.5	13.5
Non-metallic minerals	0.2	0.2	1.8	1.9
Basic metal products	13.1	14.5	3.6	2.5
Fabricated metal products	1.5	0.8	2.7	2.8
Transport equipment	2.5	1.9	16.7	12.6
Other machinery and equipment	3.6	4.1	25.4	30.8
Manufacturing n.e.c.	6.0	5.0	8.0	8.5
All industries	100.0	100.0	100.0	100.0

Source: BIE - Industrialisation in Asia - some implications for Australian industry. (1978)

Table 1.12: World gross domestic product and regions' shares of world GDP, 1975-1990, comparison of estimates for Scenarios A, B2 and D, (at 1970 US$'000m) (a)

Scenario	GDP						Percentage of world G.D.P.			
		1990			Annual average growth				1990	
Region	Actual 1975	A	B2	D	A	B2	D	Actual 1975	A	B2	D
OECD (b)	2356.7	4484	4031	3659	4.2	3.7	2.9	62.0	57	59	56
Aust. and NZ	48.8	85	80	83	3.7	3.3	3.5	1.3	1	1	1
Eastern Europe	607.8	1263	1155	1171	4.9	4.3	4.4	15.9	16	17	18
Developing Countries	815.9	2098	1544	1554	6.3	4.3	4.3	21.6	27	23	24
Of which:											
Latin America	235.5	650	507	502	6.8	5.1	5.0	6.2	8	8	8
South Asia	82.6	172	141	141	4.9	3.6	3.6	2.2	2	2	2
S.E. Asia	84.5	233	194	201	6.8	5.5	5.8	2.2	3	3	3
China	212.8	510	396	396	5.8	4.1	4.1	5.6	7	6	6
Other Developing	200.0	533	306	314	6.5	2.8	3.0	5.2	7	4	5
World Total	3802.3	7930	6762	6416	4.8	3.8	3.5	100.0	100	100	100

Source: Adapted from Organisation for Economic Co-operation and Development (1979a), Tables 21 and 22.

Notes: (a) A is a high growth scenario assuming increased free trade and increased developing country participation. B2 assumes moderate growth in the developed economies and convergence of relative productivities. D assumes mounting protectionism and the break up of the world economy into three poles (US, EEC and Japan). Scenario A is a projection of the annual average growth rate over the period 1975-2000, taken only to 1990.

(b) Includes Australia and New Zealand.

CHAPTER 2. MAJOR FACTORS AFFECTING THE FUTURE INDUSTRIAL STRUCTURE

2.1 Population

In seeking to analyze changes in the industrial structure some account must be taken of the influence of population changes. The future size and rate of growth of population will have a crucial impact on demand and supply in both the commodity and labour markets, while the changing age structure will have an important bearing on consumption patterns, the potential size of the labour force and dependency levels. For example, a more aged population would result in some re-orientation of consumer tastes and buying habits, less disposable income and a greater dependency on those in the workforce.

An additional factor which is addressed in this section is the future structure of household groups. These are categorized later in this section according to the number of adults and children per household, as well as by age of household head. Changes in the structure of household groups will be an important determinant of future patterns of consumer demand. Estimates showing how consumption patterns differ across household structures for 1974-1975 have been made by Williams.[1/] Some of the results revealed by his analysis are that:

> the proportion of total expenditure on food increases with family size and age of head, reaching around 21 per cent for the household category with two adults, no dependent children and age of head over 65;
>
> the average budget share for clothing is highest where the household head is aged 30 - 64 years (around 10 per cent), but is not much influenced by family size;
>
> expenditure on housing is a larger proportion for young families making up over 20 per cent of their total expenditure;
>
> the proportion of expenditure devoted to medical services increases with age of head and number of children, reaching up to 8 per cent; and
>
> the budget share devoted to luxury items is fairly constant across household structures, but is highest in childless families and in families with an older head and no or few children (reaching 28 - 29 per cent).

The implications of these findings, particularly as they relate to projections of likely future changes in the structure of Australian household groups, are considered later in this section.

In the case of Australia, it is also necessary to focus attention on the effect of future levels of immigration. Australia, over the post-war period, has had significant levels of net immigration, although over most of the last decade there has been a downturn. Even a level of net immigration which is well below the peak levels of post-war experience will have important implications for Australia's future economic development.

Over the next decade a continuation of the policy of encouraging immigration to Australia would add significantly to future population growth and influence the structure of the population. These points will be discussed later in this section.

At the same time, immigration will influence both the size and structure of the future labour force. Post-war immigration enabled the labour force to expand significantly as a large proportion of immigrants were of working age. Immigration policy has also focused on encouraging skilled workers. Another important characteristic of immigration has been the dominance of families in the migrant intake. This has resulted in a large number of migrant women, especially married women, joining the workforce. Thus, immigration has provided a significant number of people ready to join the workforce and has helped to alleviate skill shortages.

Over the next decade it can be expected that immigration policy will concentrate on encouraging skilled operatives and families to come to Australia. In the light of fears in some quarters that in the current economic climate immigration would add to unemployment, it might be expected that in this period immigration will concentrate particularly on alleviating skill shortages.

Immigration has also increased the size of the domestic market and this has had important ramifications for economic growth. It has also vitally affected consumption patterns. The need to re-locate has increased demands in Australia for such items as housing and consumer durables. Immigrants have also brought with them a variety of different tastes and buying habits, which has resulted in the introduction of new products and services. The retention of a policy of encouraging immigration would result in a continuation of these broad trends over the next decade.

It will therefore be necessary to consider the impact of different assumptions regarding immigration. In the light of Australian experience of declining rates of immigration over most of the 1970s, it will be assumed that net immigration will be either zero or 50,000 persons per year.[2/]

Table 2.1 gives projections on the future size and rate of growth of the Australian population. The assumption made is that the rate of natural increase will fall slowly over the projection period. Using the zero net immigration assumption, the population is projected to increase from some 12.8 million persons in 1971 to 15.7 million in 1991. This represents an annual average rate of growth of 1 per cent over the period. When these rates of growth are broken down to shorter periods, the picture emerges of a steady rate of growth over the period 1981-1991, though this growth will be below that obtained during the seventies.

Under the alternative assumption of 50,000 net immigration, the population is projected to rise to 16.5 million by 1991. Net immigration on this scale therefore raises the population by about three quarters of a million people and the rate of growth of population by about 0.4 per cent per annum.

The projected age structure of the population is shown in proportional terms in Table 2.2. Looking at the projections under zero net immigration, a number of features are clearly evident. Firstly, the projections show a fall of about 6 percentage points in the proportion of dependent children (0 - 14 years of age) in the population between 1971 and 1991. Secondly, the proportion of the population in the working age group (15 - 64 years of age) rises from around 63 per cent in 1971 to about 66 per cent in 1991. This change is mainly a result of increases in the 25 - 34 and 35 - 44 years of age groups. After 1986 the 45 - 54 years old group gradually becomes more important. Finally, the 65 years and over age group, that is, the aged dependents, rises from 8.3 per cent of the population in 1971 to 10.8 per cent in 1991.3/ These trends are also evident from the rates of growth of different age groups shown in Table 2.1.

Although the introduction of 50,000 net immigration only slightly changes the results, one interesting feature to emerge is that the proportion of the population of working age is slightly reduced, despite a slight increase in the proportion aged 25 - 34. The proportion of aged dependents is slightly decreased.

As stated above, the structure of household groups will be an important determinant of the future pattern of consumer demand because different household groups exhibit different consumption patterns. Recent estimates prepared by the Bureau of Industry Economics provided data on household groups up to 1991.4/ Using certain simplifying assumptions, the objective was to project the number for each household type. Two alternative scenarios were involved, one assuming zero and the other 50,000 net immigration per year. Table 2.3 outlines the structure of households examined and the 1991 estimates of each group.

The main features evident are the increasing proportion of single person households aged 65 years and over (types 1 and 9) and a decline in households with three or more children (type 4). Meanwhile, the household types with one and two children show only slight movements.

Introducing the assumption of 50,000 net immigration per year does not significantly alter these results except for slight increases in the proportion of household types 2, 3 and 4, reflecting the predominance of family immigration in the total intake.

The main features that have emerged from this discussion of population are that:

(i) the rate of population growth can be expected to decline until about 1986 and then stabilze somewhat thereafter at about 0.8 per cent per annum (zero net immigration) or 1.1 per cent per annum (50,000 net immigration);

(ii) the Australian population can be expected to assume a different age structure over the next decade, with a lesser proportion of dependent children and greater proportions of aged dependents and working-age people; and

(iii) projections of household types show that there is likely to be a move towards smaller households by 1991, that is, smaller families and/or a greater proportion of aged households containing no children.

These changes will have a marked effect on the future industrial structure in Australia. The initial decline in the rate of population growth, followed by a steady rate of growth after 1980, will have the effect of restricting growth in the domestic market and GDP to levels below that which would have been achieved if population growth continued at the same rate as experienced during the 70s. It will also have repercussions in the labour market, altering both the occupational structure and the workforce participation rates.

Changes in age structure and in household types will have an important bearing on consumption patterns and tastes, and hence affect the relative growth of different industries. In the light of projections concerning the ageing of the population and moves towards smaller household groups, a number of observations can be made regarding future patterns of demand.

A more aged population structure is likely to result in an increase in the share of expenditure devoted to food, but reduced expenditure on meals away from home. This effect could be offset to some degree by the tendency for increased spending on meals away from home as real incomes increase. With regard to clothing, a recent BIE study suggests that over the next decade there is likely to be a decreasing share of household income expended on clothing items.[5/]

Turning to housing, the ageing of the population and moves towards smaller households is likely to result in a decrease in the proportion of expenditure going to this item. However, the Bureau of Industry Economics, in a recent report,[6/] pointed out that the brunt of this is not likely to be felt until the 1990s, because of the delay involved between the decline in the birth rate and declines in the age groups which have a high propensity to spend on housing.

The move towards smaller families and childless household groups is likely to result in some increase in the share of household expenditure being spent on luxury items, although the Williams study revealed only a weak relationship between household size and expenditure on luxury items. Indeed, the BIE report referred to above, noted that because of the long-run complimentarity between the share of expenditure spent on housing and consumer durables, the likely reduction in expenditure shares devoted to housing would also be reflected in a reduced share going to consumer durables. However, the potential for marketing new types of consumer durables, e.g. micro-wave ovens, home video recorders etc., may mitigate against this somewhat, as would increases in real incomes.

The report also noted that young households have a greater propensity to spend on transport and communications. A more aged population may, therefore, reduce the proportion of household expenditure on these items, particularly the purchase and operation of private motor vehicles.

Changes in demographic factors will also influence the pattern of government expenditure. The declining birth rate could result in a relative reduction in expenditure on education, though this effect may be offset to some extent by a continuation of the trend to a more educated workforce. The pattern of government welfare payments is also likely to change with the increases in the proportion of the population in receipt of age and invalid pensions, and decreases in those receiving family allowances. The reduced demand for housing is likely to be reflected in a reduced share of government expenditure on housing infrastructure.

It is shown in the following section on likely trends in the labour force that the move towards fewer children would encourage more married women to join the workforce, while an ageing population structure would result in a greater proportion of the population of employable age. In addition, there is likely to be a continuing trend towards a more educated workforce. These factors would give rise to higher household incomes. These higher incomes and the higher female participation rates will result in an increased proportion of household expenditure being devoted to eating out, private transport, consumer durables and entertainment and recreation.

2.2 The labour force

This section sets out likely changes in the size and structure of the Australian labour force over the period to 1990. Particular attention is given to the expected participation rates of women and to an analysis of the labour force by skill and education. These factors are expected to have a major influence on the size and structure of the labour force over the coming decade.

Table 2.4 presents 1971 and 1976 census data on, and estimates for 1991 on working age population, labour force size and workforce participation rates by age groups. The 1991 projections use the assumption of 50,000 net annual immigration over the period from 1978 to 1991. On this basis, the potential labour force, that is those aged 15 years and over, is projected to rise from 9.1 million in 1971 and 9.9 million in 1976, to 12.6 million in 1991. This growth is due partly to the increase in the proportion of the population aged 15 years and over. However, it also represents a lower rate of growth in the potential labour force than that achieved over the 1970s. By 1986 the numbers reaching employable age (15 - 19 years) will decline under the assumption of 50,000 net annual immigration. This could result in shortages in labour, and in the short term, shortages in skilled labour. In the long term, increasing educational participation rates should act to mitigate skill shortages.

The overall labour force participation rate is projected to increase from 58.6 per cent in 1971 and 61.4 per cent in 1976, to 63.9 per cent in 1991. This factor and the increase in the proportion of the population of employable age already alluded to, are the determinants of the increased size of the labour force evidenced in Table 2.4.

For females, the average annual increases in their labour force participation rates in the periods 1954-1961, 1961-1966, 1966-1971 and 1971-1976 were 4.5 per cent, 6.2 per cent, 5.3 per cent and 3.3 per cent respectively.7/ The figures for the male labour force in the corresponding periods were 1.5 per cent, 1.6 per cent, 2.1 per cent and -0.2 per cent.

The labour force participation rate for females rose from 33.4 per cent in 1964 to 43.8 per cent in 1976. The increase was particularly spectacular for married women, rising from 24.7 per cent in 1964 to 41.5 per cent in 1976. Over the same period the overall labour force participation rate rose only from 58.7 per cent to 61.4 per cent.

Anticipating likely changes in female participation rates is a complicated exercise as these rates will be determined by demographic factors, sociological roles, educational participation rates, and economic factors such as female wage rates relative to males, and changes in the demand for different categories of labour. These influences taken together, are likely to result in an increase in female participation rates over the period to 1991 and are considered briefly below.

There are a number of reasons why the stock of jobs for women is likely to increase. Technological change which eliminates the heavy physical character of many types of employment will lead to increases in the opportunities for skilled operatives. The probable continued growth of the service sector, albeit at a reduced rate, will also provide greater opportunities in clerical and related fields. In addition, there is expected to be a continuation of the growing liberalization of societal attitudes to female employment.

Alongside this increase in the stock of jobs available to women, it is probable there will be an increase in the number of women seeking employment. It is expected that after child bearing, which is increasingly being completed at an earlier age and with less children, there will be a growing labour force return rate for married women. With regard to educational participation rates, the Borrie Report8/ assumed a slowdown in the female rate, enabling workforce participation rates of young females to be sustained.

In 1978 and 1979 there was a reversal of the general trend experienced over the rest of the 1970s towards increasing participation rates for women. The major causes appear to be: a general lessening of employment opportunities because of the recession; cuts in government spending in health, welfare and related areas (all strong growth areas for female employment in the early 1970s); and possibly the lagged effects of the 1972 equal pay decision on the demand for female labour.9/ However increases were again recorded in 1980 in line with improvements in the economic climate.

Turning to the skill composition of the labour force, Table 2.5 provides data on the occupational structure of the labour force for 1971 and 1976. Over the 5 year period 1971 to 1976, no radical changes occurred in the relative standing of the nine occupational categories shown in Table 2.5. The main changes shown are the drift towards white collar categories, especially the professional white collar category, and the reduced importance of blue collar categories, in particular semi and unskilled blue collar workers. These features point to the rising skill base of the work force. Despite these relative changes in occupational employment all the categories shown, apart from Armed Services, showed postive absolute growth over the period. Chapter 5 will provide projections on how the demand for different categories of labour can be expected to change by 1990. A detailed analysis of the future occupational structure is therefore deferred until then.

However, at this stage, a number of observations are worth making in order to obtain some perspective. Firstly, in the long-run, all occupational classifications will undergo some change. More specifically, the levels of skill associated with certain occupations will change in response to technological innovation. Secondly, although the absolute numbers in all occupations could be expected to increase, in relative terms there are likely to be gains and losses as a result of differential industry growth rates. For example, it could be expected that there will be a relative decline in the semi- and unskilled white collar categories, reflecting rising technological sophistication in the tertiary sector and also increased educational levels. On the other hand, the skilled categories, especially those associated with service industries, should experience relative increases.

The educational level of the labour force will also have an important bearing on the future size and structure of the labour force. It has already been noted that educational participation rates will have an impact on workforce participation rates, especially in the younger age groups. Continued high levels of educational participation rates will be essential, if the skill base of the labour force is to be maintained or improved. It is also likely that changes in the demand for different categories of labour may necessitate increased demand for re-education amongst the older age groups.

Data on levels of educational qualifiactions derived from the 1971 and 1976 censuses show a fall in the level of those without qualifications.[10/] From 1971 to 1976 the proportion of the workforce with trade level qualifications was steady, while the numbers with technical, other tertiary and degree status qualifications, all showed rises.[11/] This confirms the general trend towards a more educated labour force. The current high levels of unemployment have probably added to this as young people stay at school longer because of both a lack of job opportunities, and the perception that a higher qualification is directly correlated with increased ability to find employment.

While the general observation made above, of a more educated labour force is also true for females, the traditional picture of a relatively less skilled female workforce is still the case. Males are most dominant in the tertiary educated and trade categories.

Particular problems for female employment may arise in some service industries and in labour intensive manufacturing industries. A traditional area of high female employment has been in the semi- and unskilled service jobs. In the coming decade technological change in these areas could prove to be a watershed, resulting in pressures on female labour. Females have also provided signfficant employment in labour intensive manufacturing industries, in 1976-1977 accounting for 43.2 per cent in textiles, 76.7 per cent in clothing and footwear, 26.7 per cent in paper, paper products and printing, 26.3 per cent of total employment in food, beverages and tobacco, and 37.7 per cent in miscellaneous manufacturing. This compared with an average of 25.5 per cent for all manufacturing.[12/] In the coming decade, these industries are likely to face continuing pressure from imports, especially from the developing Asian economies, which would impose pressure on female employment in these areas. Accordingly, it is possible that there will be a need for some redirection and retraining of the female workforce over the next decade.

2.3 Technological change

Any assessment of the future Australian industrial structure must take into account the likely effect of technological change as it is an important determinant of the development, growth and diversification of this structur The rate of technological change has been particularly rapid over t thirty or so years since World War II with many new industries emerging and maturing based on new products, processes and materials.

An extensive study of technological change and its effects on industrial structure, income and employment has been undertaken by the Bureau of Industry Economics.[13/] This study examines th changing patterns of factor usage by Australian industries to 1990-1991. A wide range of aspects were considered including technological change, structural change, substitution, etc. A second part of the study considers the implications for the economy as a whole using a large general equilibrium model.

This section summarizes the broad developments for the economy over the next ten years, based on the findings of the BIE study. The discussion is divided into past trends and expected future developments of the four sectors of the Australian economy: agriculture, mining, manufacturing and services.

2.3.1 Agricultural sector

As was discussed in Chapter 1, agriculture's share of employment, output and exports in the Australian economy has been declining over the last two decades. Nevertheless the comparative advantage that Australia enjoys in many agricultural commodities, together with continuing gains in productivity will ensure that the sector retains an important place in the Australian economy well past 1990-1991.

Agricultural producers in Australia, due to their reliance on an export market, have been constrained in their ability to pass on rising labour and other input costs. This has forced them to seek ways to reduce their costs via technological improvements and reducing their dependence on high cost inputs such as labour. This pressure for structural adjustment has accelerated in recent years and will continue to dominate the development of agricultural industries to 1990-1991. Technological change is an intrinsic part of this adjustment and this sector will rely heavily on such improvements to achieve real growth in output and maintain farmers' profit margins.

Historically, the agricultural sector has been advantaged by cheap and abundant land, although since World War II pasture improvements have constituted the single most important productivity gain in the agricultural sector. Increases in productivity in the agricultural sector averaged approximately 3.8 per cent per year between 1963 and 1975.

Over the next ten years the greatest productivity gains in the agricultural sector are expected to come from the consolidation of small farms into larger holdings. This will enable the use of bigger more sophisticated machines, and a more productive use of labour. No change in the general types of capital equipment is expected.

However, the extension of existing technologies is expected to be a further important source of productivity improvement. Pasture improvement which began in the early 1960s is expected to continue. For the more automated activities of the sector, such as pig farming, chicken breeding and egg production where methods of production have changed from free farming to more controlled farming, productivity gains are expected to be substantial as each activity becomes increasingly automated.

New technical developments are not expected to be important. Such advances as chemical injections to replace shearing, and farming by remote control through the use of driverless tractors, are not expected to be in use before 1990-1991. However, some advances are expected through the use of microprocessors which will play an important role in farm bookkeeping and record-keeping. The inexpensive nature of these aids will lead to their widespread adoption by farmers. In addition, some advances are likely without the assistance of new equipment. For example improved productivity across most industries should result from better managerial skills. These improvements in managerial skills will comprise an improved product mix and earlier detection and response to market changes.

2.3.2 Mining sector

Over a relatively short period of time the mining sector has emerged as an important section of the Australian economy. After several decades of slow growth around long established mining areas, rapid expansion and diversification of minerals production and trade commenced in the early 1960s. This new growth substantially altered the size, structure and inputs for the mining sector. Within ten years, massive open cut mines were in operation and almost all mining activities completely mechanized. Mining exports grew rapidly from only 7.7 per cent of total Australian goods exported in 1960-1961 to 31.5 per cent in 1976-1977.[14/]

The bright prospects for further rapid growth in Australian exports of mining and processed mining products over the next decade should ensure that the mining industry will further increase its importance in the Australian economy over the period to 1990-1991.

The highly capital intensive nature of mining operations has meant that this sector has employed only a small proportion of the nation's workforce. In 1978 direct employment by this sector accounted for 1.4 per cent of total civilian employment.[15/]

The activities included in this sector are predominantly concerned with the extraction of minerals (solids, liquids or gases), and the additional activities of beneficiation (such as crushing and washing) in order to produce ores and concentrates for further processing.[16/] As a result, the sector's value added is very low and its contribution to GDP correspondingly small. In 1962-1963 the mining sector represented only 1.5 per cent of total gross product, rising to 4.0 per cent in 1976-1977 (Table 1.3).

It should be emphasized that these figures on employment and output in the mining sector do not take into consideration the possible indirect benefits stemming from Australian resource development. As mining development proceeds there are likely to be important feedback linkages to other sectors of the economy.[17/]

Compared with other sectors in the economy, mining activities have achieved relatively high labour productivity growth. In the ten years ending 1976-1977, labour productivity growth averaged 3.[illegible] per cent per year.[18/] This rapid growth can be largely attributed to two factors. Firstly, iron ore and coal mining, both of which have relatively low labour/output ratios expanded considerably during the period. Secondly, a large number of mining operations have benefitted from the use of new equipment, generally large scale operations and widespread mechanization. It is however, precisely for these reasons that although productivity is expected to remain high in these industries, there appears to be less scope for substantial future increases in productivity. There is unlikely to be any substantial increases in the scale of mining operations or their level of mechanization as these are already high, and no dramatic changes in technology are envisaged. Some growth in productivity will occur as a result of the increasing importance of coal mining, though this may be

negated to some extent by the need to mine lower quality and more inaccessible coal deposits. In addition, microprocessor control systems on machinery and computerized administration and accounting should slow down the growth in office employees and the less skilled workers in mines.

2.3.3 Manufacturing sector

As with the agricultural sector, the relative importance of the manufacturing sector has been declining in the Australian economy (see Chapter 1).

Between the years 1968-1969 and 1976-1977 growth in output per person employed in the manufacturing sector averaged 2.5 per cent per annum (Table 1.7). However, the growth and sources of labour productivity have varied across industries.[19]

Over this period, the textiles; chemical, petroleum and coal products; and miscellaneous manufacturing sub-sectors achieved on average, labour productivity growth of over 5 per cent per annum. In the case of textiles, this can be explained by the fact that pressures for rationalization, in the face of persistent import penetration, has meant that the less efficient firms have left the industry, and enabled other firms to effect some product rationalization and to increase both their level of capacity utilization and the scale of their operations.

Labour productivity growth in the miscellaneous manufacturing sub-sector is largely due to the substantial growth of labour productivity in the plastics and related products industry. The other major activities in miscellaneous manufacturing include leather and rubber products and these industries have witnessed only slow rates of labour productivity growth. The plastics and related products industry is relatively new, and comprises a large number of firms. These features of the industry have encouraged competition, a high rate of technological diffusion and product specialization.

Non-metallic mineral products, clothing and footwear, paper and printing, and basic metal products have experienced labour productivity growth slightly above the sector's average. Sub-sectors noticeably below average have been wood, wood products and furniture, fabricated metal products, and transport equipment.

Over the next ten years, it is expected that most manufacturing industries will undergo a similar rate of technological change to that which has occurred in the past and achieve similar rates of productivity growth. Slight reductions in unit costs resulting from economies of scale or substitution between inputs due to relative price changes may also occur.

Microelectronics applications will be pervasive throughout the sector though there will be some technical and commercial difficulties with the adoption of production control type microprocessors. Microprocessors which can edit, are already in use in printing and related activities. By 1990-1991 they are expected to be used widely in the production of books, newspapers and various commercial journals and stationery, and should result in significant changes in skill requirements and a reduction in the labour required to produce the same level of output. Similar technology such as the word processor, will assist support staff, while public data transfer networks based on microelectronic technology should substantially improve management information systems. Over the next ten years, those microelectronic applications which can control the mechanical operations of machines or employ 'robots' are likely to impact on a number of heavy industries, and on industries where repetitive tasks are involved in the production process.

In the chemicals, petroleum and coal products sub-sector the chemical industry should continue to reduce per unit costs through economies of scale. The rising price of oil and the subsequent need to find alternative energy sources will continue to induce pressures for technological change in the petroleum and coal products industry. The most likely developments appear to be the extraction of oil from coal or shale, although these are not likely to be significant by 1990-1991.

A high rate of technological diffusion is expected to continue in the plastics and related products industry. The trend will be towards more sophisticated equipment, automation and applications to structural plastics. Microprocessor type equipment is expected to have widespread application by 1990-1991. Such developments will result in a reduction in the skill requirements of many operators and a greater proportion of technical staff.

In the transport sub-sector, motor vehicle manufacture is expected to undergo some change over the next decade. Although the internal combustion engine is likely to continue to provide the major source of power for vehicles over the next decade, the trend towards smaller cars and concerns about fuel efficiency and pollution will necessitate some restructuring. This will be mainly in the form of the development of smaller and more efficient engines, the increased use of aerodynamic designs and the adoption of microprocessor control in fuel and ignition systems, etc. Quality standards should also be improved through the increased adoption of automation. In addition, some rationalization of operations is expected. Complementarity and commonality of component manufacture will become a feature of the industry. The development of the 'world car' concept, which should result in productivity gains through specialization, is a case in point.

In the Basic metal products sub-sector, growth in the aluminium industry (discussed in Chapter 3) is likely to provide the major area for technological development. This will be mainly in the form of the adoption of larger scale production techniques. In addition, there are opportunities for technological advance in processing through the development of direct reduction methods.[20/] Commercially viable methods of extraction of alumina from non-bauxite sources such as clays are also being developed. However, neither of these developments is likely to be of major importance by 1990-1991.

Overall, labour productivity growth in manufacturing industries is expected to follow similar trends to that which has occurred in the past. The main additional technological advances will be related to the adoption of microelectronics technology, improvements in quality and efficiency of products, and greater economies of scale, and substitution between inputs. Although microprocessor technology is expected to be widely adopted in some industries, most of its effects will be to improve the quality of supplementary aids used by firms. In the period up to 1990-1991 the type of microelectronics technology which would have substantial potential for productivity growth, namely 'robots' and the control of mechanical operations, are likely to be introduced mainly in heavy industries and for performing repetitive tasks.

2.3.4 Services sector

The service sector has always played an important part in the Australian economy. At the turn of the century, over half of the Australian workforce was employed in the service sector.[21] Since the end of World War II the service sector's share of employment has increased rapidly to reach 72.5 per cent in 1978.[22] In terms of output, the sector is equally significant and currently accounts for about two thirds of GDP.

Despite the continual expansion of the service sector, technological change in this sector has traditionally been slow relative to other sectors. This, together with the labour intensive nature of most activities has resulted in labour productivity growth in the service sector being much slower than in other sectors of the economy. Between 1964-1965 and 1975-1976 the increase in value of the services produced per person employed averaged 1.7 per cent.[23] This was approximately half of manufacturing productivity growth which averaged 3.3 per cent for the same period.[24] Within the service sector, utilities averaged over 6 per cent for the same period, reflecting the highly capital intensive nature of electricity generation and the large investment outlays in that industry over the period. Labour productivity growth in the transport and communication industries was also above average.

Most of the reduction in per unit costs which have occurred have been through economies of scale. In fact, many industries in the sector are characterized by the potential for economies of scale in almost all factor inputs. For example, in most towns, Australian banks generally have a branch requiring a building, a manager and a teller. Once the branch is established the services provided can be expanded significantly with only a small increase in factor inputs. But in the case of restaurants and hotels where capital, labour and other input costs are mostly a function of the number of services provided, there is little room for economies of scale.

Over the next ten years the services produced per person employed in the sector will substantially increase. Service industries are among those that will be most affected by the development of the microprocessor which is expected to displace labour in many of the more labour intensive activities. For example, banks, retail and wholesale trade organizations and the Australian telecommunications instrumentality will have opportunities to eliminate labour from several of their more routine clerical operations through the application of data processing units and information retrieval systems. In some instances, however, there will be technical, commercial or institutional difficulties in adopting the new technology.

Some service industries will not be as greatly affected by the microprocessor. Restaurants, entertainment, health, education and other personal and community services will remain relatively labour intensive, as these services are personal in nature. The electricity industry will be able to maintain its historically high rate of productivity growth, as the new, larger sized plants will require a similar number of operators as the existing smaller plants. In addition, the largest expansion in demand is expected from industrial usage where, relative to domestic needs, fewer workers are required to maintain services.

2.4 Investment

The pattern and growth of fixed capital formation is another important determinant of Australia's future industrial structure and is analyzed in this section.

Details of gross fixed capital expenditure from 1963-64 for selected years are shown in Tables 2.6 and 2.7. Four main features are evident. First, that the mining industry's share of gross fixed capital expenditure went through a cycle which peaked in 1971-1972 and troughed in 1976-1977. A further upswing is now underway and is likely to continue.[25/] The sharp increase in outlays during the 1960s was attributable to the large number of new development projects following earlier significant mineral discoveries. These projects were export oriented, and output was able to expand rapidly. The current increases in mining expenditure can be explained largely in terms of the changed world energy situation, including exploitation of Australian reserves of coal and gas and exploration for new reserves of oil. Coal production, where there is the greatest scope for expansion, is substantially export oriented. The discovery and exploitation of new oil reserves, on the other hand, would be directed towards overcoming an increasing reliance on imported supplies. Exploration for, and exploitation of Australian natural gas reserves would be intended both for domestic consumption and export. In particular, possibilities exist to significantly expand production through the substitution for oil.

Secondly, the share of manufacturing investment has declined considerably, falling from nearly 26 per cent in 1962-1963 to around 16 per cent in the late 1970s. However, investment in some manufacturing industries has been quite strong (see Table 2.8), particularly chemicals, petroleum and coal products. The Department of Industry and Commerce investment survey[26/] indicates that further growth is likely in this industry and in the basic metals products industry. The current annual capacity of Australian aluminium smelters is 280,000 tons. Proposed expansions and planned new smelters will increase capacity to 1,186,000 tons per annum by 1985. A substantial proportion of the total investment during the 1980s, revealed by the surveys, derives from a few very large investments in the aluminium, petroleum and coal industries.[27/] Much of the finance for these projects is likely to come from overseas, particularly since overseas corporations have an interest in many of these projects.

Thirdly, the share of investment in private dwellings rose from around 25 per cent in the mid 1960s to stabilize around 30 per cent in the mid and late 1970s. Although private dwelling expenditure tends to fluctuate in response to monetary and fiscal policy, the upward trend largely reflected changing demographic factors, particularly a high rate of new household formation. This effect can be expected to exert a declining influence during the 1980s, as became evident from the discussion in Section 2.1.

Finally, the share of investment by finance, insurance, real estate and business services increased rapidly from 4 per cent in 1962-1963 to almost 14 per cent in 1972-1973. Several factors contributed to this increase. The widespread adoption of computers in the finance industry would have added significantly to capital expenditure. However, a more important factor probably was the strong growth in expenditure on buildings and equipment for subsequent leasing and hiring to firms, many of them no doubt engaged in other industries.

For some time, there has been an increasing tendency to engage in leasing and hiring arrangements. Although these arrangements probably have little effect on the aggregate volume of investment, industry statistics will record a higher level of investment in the industry in which the owners of the leased assets are located (predominantly finance, insurance, real estate and business services) and a lower level of investment in those industries where firms are actually using the leased assets. Insufficient information is publicly available to assess how significant this tendency has been. However, it is clear that leasing arrangements are an important method of financing capital equipment. At the end of June 1980 the value of leasing arrangements for plant and equipment was $6,552 million. The value of goods newly leased during 1979-1980 amounted to $2,823 million.[28/] The greater emphasis on leasing arrangements explains, in part, the decline of the share of manufacturing in private capital formation.

Over the period to 1990 investment in environmental protection and energy conservation is likely to play an important role in economic development world wide. It is likely, however, that the effect of investment in these areas will be felt less strongly in Australia than in many other industrialized countries.

The last ten years have seen increasing public calls for conservation and restoration of the environment. While it is recognized that investment in this area will divert funds from productivity increasing projects, it is assumed that this effect will be relatively small compared to many other industrialized countries.

The question of the impact of rising fuel costs on investment patterns in Australia is more complex. Australia has a strong energy base. In the important area of oil consumption, some 70 per cent of Australia's crude oil requirements are currently supplied by domestic production, although if no new discoveries are made, Australia will be importing 45 per cent of its oil supply by 1985 and about 65 per cent by 1990.[29/] In addition Australia has good supplies of coal, natural gas and uranium, and the potential to exploit solar power, when the appropriate technology is developed and fuel from crops. Shale oil deposits should also provide additional energy

possibilities. On the basis of these reserves, the next ten years should see a large increase in investment in industries involved in the extraction of these energy products, with a large proportion of the output intended for export. Mining investment will be concentrated in the energy sector, with a substantial number of coal projects in NSW and Queensland, commitment to petroleum products in the Cooper Basin (South Australia), and North West Shelf (Western Australia) and uranium mining primarily in the Northern Territory. Roxby Downs (in South Australia) offers metals extraction possibilities.

There is also likely to be an increase in investment directed towards the processing of minerals to take advantage of Australia's energy reserves, with aluminium being the most striking case in point. Department of Industry and Commerce surveys[30/] suggest that during the first half of the 1980s investment in aluminium refineries and fabrication will represent more than two thirds of total investment in manufacturing projects exceeding $5 million in value. The cheapness of Australian electricity (from coal in NSW, Victoria and Queensland and from hydro-power in Tasmania) is an important justification for new and expansion projects for alumina and aluminium production. Other areas of significant manufacturing investment during the early 1980s are chemicals (especially petrochemicals), pulp and paper products. Concomitant with the development of investment in the aluminium industry is increased Government expenditure in electricity generation. This will be approximately of the same magnitude as direct investment in aluminium production. To meet the expected growth demand for electricity the Commonwealth Government has offered the States expanded access to loan funding for coal fired electricity generation.

On the negative side, the world wide concern with the need to conserve energy has in many cases been met by policies which have tended to lower the rate of growth of demand for all goods.

Clearly, investment in Australia has been, and will continue to be, affected by the downturn in international economic growth. In addition, Australia's strong energy base tended, in the past, to make Australia complacent about the need for energy conservation. World prices for crude oil rose 400 per cent in 1973-1974 but it was not until the 1977-1978 Budget that the Australian Government began to bring local prices to import parity. Consequently, much of the adjustment that has already been faced in many other industrialized countries, in relation to oil conservation and the development of more energy efficient production processes and substitutes for oil in these production processes, has yet to be faced in Australia. This will require some diversion of investment funds from productivity increasing projects in the period to 1990.

Traditionally, most of Australia's investment has been financed from domestic savings, though foreign investment has also played an important role. Foreign investment inflows into Australia represent a significantly higher proportion of gross domestic capital formation than in other industrialized countries with populations of similar size. Since the Second World War, capital inflows into Australia have averaged about 11 per cent of gross national savings.[31/] Australia then, has experienced high levels of foreign investment, but savings have also been high, with the proportion of savings to GDP in Australia being higher than in many other developed countries.[32/]

Foreign investment has been particularly important in the manufacturing and mining sectors. In 1972-1973 foreign ownership of the mining and manufacturing industries in terms of value added stood at 50 per cent and 31 per cent respectively.[33/]

There are a number of factors contributing towards the high levels of foreign investment attained in Australia. Firstly, Australia throughout its history, has adopted a relatively open door policy towards overseas investment. This will be discussed later in the chapter. Secondly, a relatively large proportion of domestic savings goes to investment in private dwellings in Australia. Over the period 1972-1973 to 1977-1978 an average 25.6 per cent of total Australian GDP went to savings and in turn 30.4 per cent of these savings went to investment in dwellings. This compares for example, with 19.7 and 17.9 per cent respectively in the UK over the same period.[34/] Finally, the ability of the local capital markets to mobilize domestic savings, partly because of government regulations, and partly because of the market's own limitations, has come under some criticism.[35/] The limitations of the local market arise from:

the absence of a national stock exchange which can act as a centralized source of information;

restrictions on interstate financial mobility, due to State Government duties such as stamp duty;

Government regulations on financial intermediaries which require these financial bodies to provide a certain amount of funds for housing, and to support government loan raising; and

the preference of small investors for debenture and note issues, and deposits with savings banks and building societies, and the reluctance of small Australian investors to participate in equity issues and to invest in risk and/or developmental projects.

All of these factors suggest that without major changes in Australia's investment patterns and improvements in the functioning of local capital markets, foreign investment will continue to play an important role in total investment in Australia over the next decade. It may well be, however, that even if the capital market were deregulated, substantial foreign investment would be needed to finance the high levels of capital formation expected in Australia in the 1980s, particularly in the mining and mineral processing industries.

In examining the importance of foreign investment in Australia, it is only possible to consider that part of foreign investment identified as capital inflow into enterprises, including the national inflows of retained earnings by foreign enterprises in Australia. Statistics are not available on the total volume of funds raised by foreign interests in the local capital market and strictly speaking this does not accord with foreign investment as defined for the purposes of this analysis. However, funds derived from this source appear to have become a significant part of total investment by foreign interests in Australia in the 1970s.

Table 2.9 shows the inflows of foreign investment as a percentage of net investment expenditure by enterprises. During the 1960s, foreign investment inflows into enterprises rose from the 1950s average of 17.3 of net investment expenditure to reach 35.3 per cent in 1967-1968 and peak in 1970-1971 at 36.8 per cent. In 1972-1973 however, foreign investment inflow fell dramatically and in the six years from 1972-1973 to 1977-1978 averaged only 12.1 per cent of net investment expenditure.

Recently there has been some recovery in overall foreign capital inflows into enterprises, particularly in 1976-1977 and 1977-1978 when these inflows (in current price terms) reached the record levels prevailing in the early 1970s. Recent indications suggest that this recovery in foreign investment is likely to accelerate over the next few years.

In explaining the year to year variability of foreign investment inflows, particularly the marked decline in the early 1970s, it is obvious that changing economic conditions in Australia account for some of the variability and will continue to do so over the next ten years. In addition, foreign investment was also affected by several government measures, some of which had no impact on domestic investment. Table 2.9 shows that in 1973-1974 the net inflow of foreign funds was $17 million lower than the previous year, while domestic investment expenditure was higher than the previous year by a massive $2,390 million.

The measures mentioned above took two forms. Firstly, a series of restrictions were introduced by the Government from 1972-1973 to 1973-1974. The 1972-1973 measures included an embargo on foreign borrowings of two years maturity or less, the establishment of an authority to vet foreign takeovers on the grounds of national interest, and the introduction of a variable deposit requirement scheme under which 25 per cent of foreign borrowings with a maturity exceeding two years were required to be lodged in an interest-free special account with the Reserve Bank. Secondly, there were several appreciations in the exchange rate. In 1973-1974 further restrictions were introduced including a rise in the variable deposit requirement ratio, the establishment of a Foreign Investment Review Board to provide a more comprehensive screening of foreign investment, and in addition, a further 5 per cent appreciation in the exchange rate occurred. In 1974-1975 an improvement in capital inflow occurred as the variable deposit requirement scheme was abandoned, the embargo on foreign borrowings was reduced to apply only to those of less than six months, and the Australian dollar was appreciated.

Significant changes have also occurred in the past few years in the sources of private foreign capital inflows into enterprises as shown in Table 2.10. While the major contributors to capital inflow remain the United Kingdom and the United States, the proportion of funds coming from the United Kingdom has declined, while those from Japan and the EEC have grown. If retained earnings are excluded, the capital inflow from the United Kingdom has been negligible over recent years. The 'other countries' group comprises mainly Switzerland, Sweden, Bermuda, Singapore and Hong Kong. As capital inflows are recorded in terms of direct source, it is likely that a significant proportion of the funds classified as belonging to this group may originate from United States and United Kingdom sources as well as other major industrial countries that are capital exporters.

Table 2.11 shows changes in the direction of foreign investment. These changes have, to a large extent, reflected developments within the Australian economy, such as the rapid growth in investment in the manufacturing sector in the first half of the 1960s and again from 1973-1974 onwards, and the increase in importance of the mining sector in the late 1960s. During the late 1950s and early 1960s over half of direct foreign investment went to the manufacturing sector. From the mid 1960s the share of investment in manufacturing fell, while investment in primary production grew. This latter growth can be accounted for by the fact that primary production includes mining and quarrying and oil exploration and production, which experienced a boom during this period. Throughout the 1970s the share of total foreign funds invested in manufacturing grew, while that in primary production fell dramatically, and the share of foreign funds devoted to the other industries section grew steadily. This latest trend can be accounted for by both increasing foreign investment in the two categories, finance and property, and commerce, and growth in demand for facilities such as transport, communications and commercial services.

The last few years have seen several changes in foreign investment policies in Australia. In April 1976 the Federal Government established new criteria for foreign investment. Under this policy, foreign investment proposals are examined by a Foreign Investment Review Board where they involve: a foreign interest acquiring or increasing a holding of 15 per cent in an Australian business; the establishment of new non-bank financial institutions and insurance companies; the amount of investment in a new mining or a natural resource project exceeding $1 million; certain acquisitions by foreign interests of Australian real estate. The criteria adopted for considering each proposal is whether the investment is contrary to the national interest. In determining the national interest, the Board is intended to have regard to the net economic benefits and employment opportunities, the level of Australian equity participation and whether the proposed investment is compatible with the Government's economic and social policies.

In addition, guidelines were determined for certain keys areas of the economy, namely: production and development of oil, natural gas, uranium and all other minerals, agricultural and pastoral projects, and forestry and fishing projects. Two objectives were sought under these guidelines. For uranium mining, but not enrichment and investments in the nuclear fuel cycle, a minimum of 75 per cent Australian equity and control was deemed necessary. In the remaining key areas a new project which has met the general criteria will be allowed to proceed only if it has a minimum 50 per cent Australian equity and Australian voting strength on the board. Where the 50 per cent local equity cannot be achieved, the Government could allow the investment and seek an increase in Australian equity within an agreed period. In June 1978 the Government announced changes to this policy. Under this review, the threshold levels for examination for foreign investment were raised from $1 million to $5 million. Where a foreign-owned company seeks to acquire a local enterprise approval by the Foreign Investment Review Board was not normally required unless the asset value of the Asutralian company was $1 million or more, but under the review this level was raised to $2 million. For real estate, it was announced that approval need not be sought for individual acquisitions of less than $250,000.

Under this review of foreign investment guidelines, a new naturalization provision was added, whereby predominantly foreign-owned companies were to be encouraged to move towards Australian ownership.

In June 1978 the Federal Government revised its uranium guidelines. Under these changes a uranium project may proceed with less than 75 per cent Australian equity where it is demonstrated that 75 per cent of Australian equity is clearly unavailable; the project would be of significant economic benefit to Australia; there would be at least 50 per cent Australian equity; and Australian participation would have the major role in determining the policy of the project.

All other things being equal, these changes in the guidelines will increase the ease of entry of foreign capital into Australia, particularly in the primary sector and will act to ensure that foreign investment will continue to play an important role in economic development within Australia in the 1980s.

On the other side of the foreign investment coin is Australian investment overseas. In comparison with foreign investment in Australia, investment overseas by Australians is small. This is shown by comparing Table 2.12 with Table 2.9.

Table 2.12 examines the outflow of Australian investment by receiving country for the period 1968-1969 to 1977-1978. Throughout this period a large proportion of this outflow has been centered on New Zealand and Papua New Guinea. Indeed much of the growth of the late 1960s and early 1970s is attributable to Australian companies located in Papua New Guinea associated with the Bouganville copper project. Since 1973-1974 a significant proportion of Australian investment overseas has also gone to the ASEAN countries in contrast to the period prior to 1973-1974 when only minor outflows of Australian capital went to these countries.

Over the next decade, there are unlikely to be major shifts in the direction of Australian investment abroad, with New Zealand, Papua New Guinea and ASEAN remaining the major individual recipients. The strength of cultural ties between Australia and New Zealand point to a continuing high level of Australian investment in that country. In addition, there is currently discussion being held on the ways of achieving closer economic co-operation between Australia and New Zealand. These discussions include examination of measures aimed at greater financial integration. Any increased co-operation as a result of these discussions is likely to result in an increase of Australian investment in New Zealand.

For Papua New Guinea, the granting of independence may lead to some decrease in the proportion of Australian funds going to that country, as would current moves by the Papua New Guinea Government to become less economically reliant on Australia. The strong political and economic ties between the two countries should, however, ensure that Papua New Guinea remains a large recipient of Australian overseas investment.

The rapid industrialization by some Asian countries should also provide Australian investors with increased opportunities. Three factors are likely to be particularly important in determining such an outcome. First, current trends towards higher oil prices are likely to lead to some regionalization of trade which may lead to increased Australian investment in Asian countries. On the other hand, it may also result in a slow-down in economic growth in the developing countries of Asia with a consequent reduction in the rate of investment in these countries. Secondly, the investment incentives which these countries offer are likely to play an important role in attracting overseas investment. Finally, the likelihood of some reductions in the amount of protection afforded to Australian manufacturing industries over the next decade could affect the level of Australian investment in developing economies. The subsequent adjustment pressures faced by the industries involved may result in an increase in investment by these industries abroad, in order to take advantage of the relative economic efficiency of overseas countries in producing such products. It should be noted, however, that despite these developments and the likelihood of increased foreign investment by Australians, the magnitude of capital outflow is likely to remain small in relation to capital inflow.

Footnotes

1. Williams, (1978).

2. In 1979, the latest year for which data is available, net immigration into Australia was about 72,000. This represents a significant increase on the level assumed in this study. Immigration levels have, however, tended to fluctuate widely from year to year and for this reason no alteration was made to the assumptions used. In addition, the numbers of immigrants entering as refugees and 'hardship' cases has increased significantly in recent years. In 1979 these comprised about 25 per cent of total arrivals, adding significantly to net immigration levels.

3. Over the next decade, the effect of a falling rate of natural increase will act mainly to increase the proportion of the population in the working age group. After then, it will increasingly act to raise the proportion of aged dependents.

4. Bureau of Industry Economics (1981a). The analysis used defined household or consumer groups which essentially correspond to those used in Williams, R.A., op.cit. The 1974-1975 survey data used by Williams is based on capital cities only. To increase coverage 1975-1976 national survey data were used.

5. Lee, T., Hart, D., and Fitzpatrick, M. (1979).

6. Bureau of Industry Economics (1979a).

7. These figures alone tend to overstate the impact of the rise in female participation rates during the 1950s and 1960s relative to the 1970s, as overall employment growth over the period 1954-1971 averaged 2.9 per cent per year, whereas in the period 1971-1976 it averaged only 1.4 per cent per year.

8. National Population Inquiry (1975), p.333.

9. Some work, however, suggests that a worsening of female employment relative to males should not necessarily be linked back to the introduction of equal pay. See Gregory and Duncan (1978), p.31.

10. Unfortunately, the data on occupations provided in Table 2.5 are not compatible with the data on the educational qualifications of the workforce. This problem is compounded by a change in the question on educational qualification as between the 1971 and 1976 censuses.

11. A direct comparison of the figures is difficult because the 'unclassified' category made up only slightly above 2 per cent in 1971, but approached 13 per cent for the 1976 census.

12. Bureau of Industry Economics (1979a), Table 3.3.

13. Bureau of Industry Economics (1981a).

14. Department of Overseas Trade, Exports of Manufactures and Primary Products

15. Bureau of Industry Economics (1979b), Table A4.1.

16. The refining smelting and other processing stages of metal production, such as iron ore to steel, bauxite to alumina/aluminium are part of manufacturing activities.

17. See, for example, Norman (1980).

18. Bureau of Industry Economics (1981a), p.10.

19. Although the sources and rates of growth of labour productivity have varied across industries, in terms of output per person employed the trend rates of labour productivity growth of individual industries have not changed significantly over the post-war period. See Marsden and Andersen (1979). However, when productivity is measured in terms of man hours it appears there has been significant change in trend rates of productivity growth during the seventies. See Gregory and Duncan (1980).

20. This would eliminate the alumina stage of processing.

21. Dowie (1970), p.231.

22. Australian Bureau of Statistics. The Labour Force, Catalogue No. 6204.0, various issues.

23. Bureau of Industry Economics (1981b).

24. Ibid. The report also notes that when productivity growth is measured to reflect changes in hours worked per employee the difference between productivity growth in manufactures and services is much less pronounced.

25. See list of major investment projects in various stages of commitment in Department of Industry and Commerce (December 1980), Survey of Major Mining and Manufacturing Projects.

26. Ibid.

27. This conclusion is partly the result of the survey taking into account in general only investments of over $5 million.

28. Australian Bureau of Statistics, Finance Companies, Australia, August 1980, Catalogue No. 5614.0.

29. Australia: Energy Outlook, (1980).

30. Department of Industry and Commerce, Survey of Major Mining and Manufacturing Projects, (various issues).

31. Foreign Investment Review Board (1980), p.11.

32. Select Committee on Foreign Ownership and Control of Australian Resources Report No. 1 October 1972.

33. Australian Bureau of Statistics, Foreign Ownership and Control in the Mining Industry, 1973-1974 and 1974-1975, Ref. No. 10.42, and Foreign Ownership and Control in Manufacturing, 1972-1973, Ref. No. 12.37. This is the latest common year for which data are available.

34. Australian figures derived from Australian Bureau of Statistics, Australian National Accounts, National Income and Expenditure 1976-1977, No. 5204.0. United Kingdom figures from Central Statistical Office (1979).

35. See, for example, Study Group on Structural Adjustment (1979).

Table 2.1: Projected size, age, and growth rates for the Australian population, actual 1971 and 1978 and projected 1981, 1986 and 199'

Age group	Population ('000)		Average annual rate of growth (%)	Assuming zero net immigration(a)						Assuming 50,000 net immigration per annum(a)					
				Population ('000)			Average annual rates of growth %			Population ('000)			Average annual rates of growth %		
	1971	1978	1971-1978	1981	1986	1991	1978-81	1981-86	1986-91	1981	1986	1991	1978-81	1981-86	1986-91
0-14	3670.1	3729.2	0.2	3635.4	3572.8	3599.3	-0.8	-0.3	0.1	3685.4	3720.3	3849.2	-0.4	0.2	0.7
15-19	1110.2	1286.2	2.1	1264.8	1277.9	1236.9	-0.6	0.2	-0.7	1276.3	1308.3	1293.6	-0.3	0.5	-0.2
20-24	1096.9	1202.3	1.3	1255.4	1257.6	1270.7	1.4	0.0	0.2	1278.5	1302.7	1334.6	2.0	0.4	0.5
25-34	1734.7	2259.9	3.8	2341.5	2417.9	2494.3	1.2	0.6	0.6	2381.7	2536.6	2675.4	1.7	1.3	1.1
35-44	1527.4	1661.9	1.2	1819.9	2135.6	2308.4	3.0	3.2	1.6	1835.5	2189.4	2423.1	3.3	3.5	2.0
45-54	1444.5	1534.6	0.9	1505.4	1541.5	1755.4	-0.6	0.5	2.6	1510.9	1560.7	1797.6	-0.5	0.6	2.8
55-59	605.4	689.6	1.9	732.6	727.5	690.2	2.0	-0.1	-1.1	734.4	732.7	700.0	2.1	0.0	-0.9
60-64	501.5	581.0	2.1	602.6	681.8	676.7	1.2	2.5	-0.2	605.2	687.3	685.4	1.4	2.5	-0.2
65+	1065.0	1314.5	3.0	1407.3	1542.0	1702.8	2.3	1.8	2.0	1412.5	1557.5	1728.7	2.4	2.0	2.1
Total	12755.6	14259.0	1.6	14564.9	15154.7	15734.6	0.7	0.8	0.8	14720.3	15595.6	16487.8	1.1	1.2	1.1

Sources: Australian Bureau of Statistics, The Labour Force, various issues, No. 6204.0, and Projections of the Population of Australia 1978 to 2011, No. 3204.0, and Summary of Population - Australia, No. 2.83.9.

Note: (a) After 30 June 1978.

Table 2.2 : Age structure of the Australian population, actual 1971 and 1978 and projected 1981, 1986 and 1991 (percentages)

Age group	1971	1978	Zero net immigration			50,000 net immigration		
			1981	1986	1991	1981	1986	1991
0-14	28.8	26.2	25.0	23.6	22.9	25.0	23.9	23.3
15-19	8.7	9.0	9.7	8.4	7.9	8.7	8.4	7.8
20-24	8.6	8.4	8.6	8.3	8.1	8.7	8.4	8.1
25-34	13.6	15.8	16.1	16.0	15.9	16.2	16.3	16.2
35-44	12.0	11.7	12.5	14.1	14.7	12.5	14.0	14.7
45-54	11.3	10.8	10.3	10.2	11.2	10.3	10.0	10.9
55-59	4.7	4.8	5.0	4.8	4.4	5.0	4.7	4.2
60-64	3.9	4.1	4.1	4.5	4.3	4.1	4.4	4.2
15-64	62.8	64.6	65.3	66.3	66.5	65.5	66.2	66.1
65+	8.3	9.2	9.7	10.2	10.8	9.6	10.0	10.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Australian Bureau of Statistics, Summary of Population - Australia, No. 2.83.9, and Projections of the Population of Australia 1978 to 2011, No. 3204.0.

Table 2.3 : Definitions and projections of household types for Australia, 1976 and 1991

Household type	Number of adults	Age of head	Number of children[a]	Number and percentage of households									
				1976				1991					
								50,000 net immigration				Zero net immigration.			
				'000				'000				'000			
)	1	65+[b]	0	79.5)		1.9)		154.6)		2.7)		148.0)		2.7)	
1)	1	15-64	0	403.6)	625.6	9.7)	15.0	524.7)	840.3	9.2)	14.7	505.7)	805.6	9.2)	14.7
)	1	15-65+	1+	142.5)		3.4)		161.0)		2.8)		152.9)		2.8)	
2	2	15-44	0	462.4		11.1		602.2		10.6		563.5		10.3	
3	2	15-44	1-2	845.7		20.3		1116.3		19.6		1049.1		19.1	
4	2	15-65+	3+	494.4		11.9		369.0		6.5		349.2		6.4	
5	2	45-64	0	406.3		9.8		631.0		11.1		618.9		11.3	
6	3+	15-65+	0	318.2		7.7		511.2		9.0		499.3		9.1	
7	2	45-65+	1-2	218.8		5.3		309.1		5.4		304.1		5.5	
8	3+	15-65+	1+	338.4		8.1		387.4		6.8		375.5		6.9	
)	2	65+	0	288.6)		6.9)		624.0)		11.0)		614.1)		11.2)	
9					447.6		10.7		924.1		16.2		914.7		16.7
)	1	65+[b]	0	159)		3.8)		300.1)		5.3)		300.6)		5.5)	
				4157.6		100.0		5690.6		100.0		5480.9		100.0	

Source: Bureau of Industry Economics, The Long Run Impact of Technological Change on the Structure of Australian Industry to 1990-91, Research Report, AGPS, Canberra, 1981.

Notes : (a) Persons less than 18 years of age.
(b) Single person households with age of head 65 years and over have been allocated in the ratio of 2:1 between household types 1 and 9.

Table 2.4 : Labour force size and participation rates, actual 1971 and 1976 and projected 1991[a]

	Labour force participation rates (%)								
	1971			1976			1991[b]		
Age	Males	Females	Total	Males	Females	Total	Males	Females	Total
15-19	55.7	52.1	53.9	55.9	50.3	53.2	58.0	56.3	57.2
20-24	89.1	58.6	74.1	89.4	65.0	77.3	90.0	66.0	78.2
25-34	94.8	38.9	67.6	95.8	49.9	73.2	98.0	52.0	75.7
35-44	94.9	44.4	70.5	95.9	57.9	77.4	98.0	59.2	79.1
45-54	93.0	40.0	66.9	93.2	50.7	72.5	95.0	58.3	76.9
55-59	88.4	20.3	58.2	86.9	35.2	60.8	86.0	54.0	69.9
60-64	75.6	15.9	44.9	68.4	18.2	42.3	72.0	16.2	43.3
65+	22.2	4.2	11.7	16.8	5.3	10.2	20.0	3.4	10.2
Total	80.3	37.1	58.6	79.3	43.8	61.4	82.1	47.0	64.5
Working age population ('000)	4532.2	4553.4	9085.6	4885.5	4973.6	9858.1	6086.5	6164.6	12252.1
Labour force ('000)	3639.7	1690.8	5330.5	3875.3	2179.7	6055.0	4998.0	2898.9	7896.9

Sources: Adapted from First Report of the National Population Inquiry, Population and Australia : A Demographic Analysis and Projection, V. 1, AGPS, Canberra, (1975) Tables VIII A.1, A.4 and A.5, Census of Population, 1971 and Census of Population and Housing, 1976.

Notes: (a) Assumes a declining rate of natural increase and 50,000 net annual immigration after 1978.
(b) Projected 1991 labour force participation rates use 1971 participation rates as a base.

Table 2.5: Occupational employment, 1971 and 1976

Occupation	1971		1976	
	Number employed	Percentage contribution to total employment	Number employed	Percentage contribution to total employment
Professional white collar	193,260	3.8	285,029	5.2
Skilled white collar	668,890	13.1	748,873	13.7
Semi- and unskilled white collar	1,367,300	26.8	1,520,628	27.8
Skilled blue collar - metal and electrical	516,606	10.1	522,075	9.5
Skilled blue collar - building	202,344	4.0	213,955	3.9
Skilled blue collar - other	142,778	2.8	128,366	2.3
Semi- and unskilled blue collar	1,539,807	30.2	1,561,079	28.5
Rural workers	402,202	7.9	430,837	7.9
Armed services	65,698	1.3	61,215	1.1
Total	5,098,886[a]	100.0	5,472,057	100.0

Source: Bureau of Industry Economics, The Long-Run Impact of Technological Changes on the Structure of Australian Industry to 1990-91, AGPS, Canberra, 1981, and ABS Censuses of Population and Housing, 1971 and 1976.

Note: (a) The discrepancy between this total and the more commonly quoted figure of 5.2 million is due to the need to base much of the employment in particular service industries on 1971 economic census data.

Table 2.6 : Gross fixed capital expenditure at current prices, Australia, 1959-60 to 1978-79 ($ millions)

	59-60	60-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70	70-71	71-72	72-73	73-74(a)	74-75	75-76	76-77	77-78	78-79
Mining	45	49	52	77	74	116	231	253	336	447	547	800	872	457	525	707	654	490	804	1139
Manufacturing	511	610	632	662	683	895	972	930	900	1002	1119	1187	1262	1009	1200	1547	1492	1748	2104	2426
Agriculture etc.(b)	347	369	344	393	511	510	462	548	507	561	456	412	467	658						
Electricity, gas and water (b)	8	12	6	6	10	10	10	11	13	17	10	9	11	16						
Construction (b)	56	59	61	76	85	99	105	91	123	139	132	132	127	167						
Wholesale and retail (b)	299	302	289	320	344	358	378	302	390	442	489	571	559	618						
Transport etc. (b)	93	118	97	110	142	102	101	178	182	229	245	276	216	255						
Finance etc. (b)	93	94	96	102	144	172	220	246	276	371	437	638	721	910						
Community services etc. and personal services (b) (c)	118	130	146	159	151	153	106	194	237	227	240	278	291	294						
Total excluding mining and manufacturing	1014	1004	1039	1176	1387	1404	1542	1650	1728	1906	2009	2262	2392	2918	3468	3053	4876	5140	6268	6890
Ownership of dwellings	620	673	603	663	767	905	912	908	1120	1294	1480	1536	1775	2121	2581	2439	3225	4041	3077	4020
Total	2190	2415	2327	2570	2919	3398	3657	3826	4164	4720	5162	5838	6301	6585	7774	8542	10247	12019	13053	14475p

Source : Australian Bureau of Statistics, Australian National Accounts : National Income and Expenditure, No. 5204.0 and New Capital Expenditure by Private Enterprises in Australia, No. 5626.0.

Notes : (a) Derived by extending the Australian National Accounts series using statistics from Cat. No. 5626.0.
(b) Separate breakdown not available after 1972-73.
(c) Comprises entertainment, recreation, restaurants, hotels and personal services.

Table 3.7 : Gross fixed capital expenditure, Australia, 1959-60 to 1978-79 (percentage shares)

	59-60	60-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70	70-71	71-72	72-73	73-74	74-75	75-76	76-77	77-78	78-79
Mining	2.1	2.0	2.2	3.0	2.5	3.4	6.3	6.6	8.1	9.5	10.6	13.7	13.8	6.9	6.7	8.2	6.4	4.1	6.2	7.9
Manufacturing	23.3	25.2	27.2	25.7	23.4	26.3	26.6	24.5	23.5	21.2	21.7	20.3	20.0	16.5	15.4	18.1	14.6	14.5	16.1	16.8
Agriculture etc.(b)	15.8	15.3	14.8	15.2	17.5	15.0	12.6	14.3	12.2	11.9	8.8	7.1	7.4	10.0						
Electricity, gas and water(b)	0.4	0.5	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2						
Construction(b)	2.5	2.4	2.6	2.9	2.9	2.9	2.9	2.4	3.0	2.9	2.6	2.3	2.0	2.5						
Wholesale and retail (b)	13.7	12.5	12.4	12.5	11.8	10.5	10.3	10.1	9.4	9.3	9.5	9.8	8.9	9.4						
Transport etc.(b)	4.2	4.1	4.2	4.3	4.8	5.4	4.9	4.7	4.4	4.8	4.7	4.7	3.4	3.9						
Finance etc.(b)	4.2	4.0	4.1	4.0	4.9	5.1	6.0	6.4	6.6	7.8	8.5	10.9	11.4	13.8						
Community services etc. and personal services(b)(c)	5.4	5.4	6.3	6.5	5.2	4.5	5.1	5.0	5.7	4.8	4.6	4.8	4.6	4.5						
Total excluding mining and manufacturing	46.3	44.9	44.6	45.6	47.4	43.7	42.2	43.1	41.5	41.9	38.9	38.7	37.9	44.3	44.6	45.1	47.6	47.8	48.0	47.6
Ownership of dwellings	28.3	27.9	25.9	25.7	26.3	26.6	24.9	25.8	26.9	27.4	28.8	26.3	28.2	32.2	33.2	28.6	31.5	33.6	29.7	29.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : Australian Bureau of Statistics, Australian National Accounts : National Income and Expenditure, No. 5204.0 and New Capital Expenditure by Private Enterprises in Australia, No. 5626.0.

Notes : (a) Derived by extending the Australian National Accounts series using statistics from Cat. No. 5626.0.
(b) Separate breakdown not available after 1972-73.
(c) Comprises entertainment, recreation, restaurants, hotels and personal services.

Table 2.8 : Mining and manufacturing, fixed capital expenditure, by industry at current prices, Australia 1963-64, 1968-69 and 1972-73 to 1978-79 ($ millions)

	63-64	68-69	72-73	73-74	74-75[a]	75-76	76-77	77-78	78-79
Mining									
- Metallic minerals			174	191	267	248	454	455	474
- Coal			110	116	187	249	276	301	519
- Oil and gas									
- Construction materials			11	23	19	24	16	27	22
- Other non-metallic minerals			19	12	16	28	21	18	25
Total	74	304	322	342	489	549	766	802	1040
Manufacturing									
- Food, beverages and tobacco			223.1	249.6	281.8	305.4	384.2	414.4	459.7
- Textiles			25.1	45.3	35.7	27.6	26.1	27.5	32.1
- Clothing and footwear			19.2	20.2	14.2	15.5	15.2	20.2	25.6
- Wood, wood products and furniture			53.7	57.8	75.2	84.3	81.6	53.3	70.8
- Paper, and paper products			90.5	73.4	97.4	83.8	114.0	133.3	209.9
- Chemicals, petrol and coal products			127.5	105.6	136.4	148.9	171.0	349.0	427.1
- Non-metallic mineral products			73.1	95.9	108.6	128.5	99.7	130.8	145.2
- Basic mineral products			329.7	211.3	283.8	284.0	249.3	268.4	304.8
- Fabricated metal products			56.0	55.5	81.8	78.9	79.5	73.0	92.8
- Transport equipment			110.1	125.2	134.1	110.1	140.2	189.3	228.1
- Other machinery and equipment			93.6	110.4	129.0	122.4	123.6	137.2	173.7
- Miscellaneous manufacturing			42.9	65.8	67.8	62.2	63.6	82.9	93.0
Total	685	1002	1244.4	1215.5	1445.9	1451.7	1548.0	1879.4	2262.8

Sources: Australian Bureau of Statistics: Manufacturing Establishments: Details of Operations by Industry Class, Australia Cat. No. 8203.0 and Census of Mining Establishments: Summary of Operations (Preliminary) by Industry Class, Australia Cat. No. 8401.0.

Note : (a) Data for manufacturing capital expenditure after 1974-75 relates to multi-establishment enterprises and enterprises employing more than four people only.

Table 2.9 : Inflow of foreign investment in enterprises and net investment expenditure by enterprises, Australia, 1948-49 to 1977-78.

Year	Inflow of foreign investment in enterprises (a) ($m)	Net investment expenditure by enterprises ($m)	Foreign investment as percentage of net investment expenditure by enterprises (%)
1948-49	85	473	17.9
1949-50	137	496	27.6
1950-51	137	999	13.7
1951-52	172	1,494	11.5
1952-53	51	476	10.7
1953-54	138	952	14.4
1954-55	210	1,256	16.7
1955-56	234	1,309	17.8
1956-57	209	1,153	18.1
1957-58	207	1,163	17.7
1958-59	248	1,167	21.2
1959-60	388	1,516	25.5
1960-61	473	1,806	26.1
1961-62	297	1,101	26.9
1962-63	467	1,638	28.5
1963-64	453	1,808	25.0
1964-65	584	2,504	23.3
1965-66	694	2,367	29.3
1966-67	516	2,374	21.7
1967-68	964	2,725	35.3
1968-69	1,00[illegible]	3,143	31.9
1969-70	994	3,578	27.7
1970-71	1,549	4,207	36.8
1971-72	1,446	4,246	34.0
1972-73	484	4,255	11.3
1973-74	471	6,645	7.0
1974-75	881	7,455	11.8
1975-76	762	8,222	9.2
1976-77	1,551	10,027	15.4
1977-78	1,451	9,370	15.5

Source : Foreign Investment Review Board (1978).

Note : (a) Includes some foreign investment in public enterprises.

Table 2.10: Inflow of foreign investment in enterprises in Australia, by country, 1947-48 to 1976-77

Year ended 30 June	UK		USA		Canada		Japan		EEC (Excl. UK)		Other countries		Total
	$m	%	$m	%	$m	%	$m	%	$m	%	$m	%	$m
1948-57	928	64	381 (a)	26							141 (b)	10	1,450
1958-67	1,865	43	1,850 (a)	43							602 (b)	14	4,327
1968-72	2,143	36	2,095	35	180	3					1,539 (b)	26	5,957
1973-77	953	23	1,599	39	123	3	492	12	557	13	424	10	4,149

Source : Foreign Investment Review Board, Report, 1978.

Notes: (a) Includes Canada
(b) Includes Japan and EEC

Table 2.11 : Inflow of direct foreign investment in enterprises, by industry group, Australia, 1957-67, 1968-72 and 1973-77.

Year ended 30 June.	Primary production (a)		Manufacturing		Other industries		Total
	$m	%	$m	%	$m	%	$m
1957-67	497	13	2,031	54	1,202	32	3,731
1968-72	1,234	34	1,087	30	1,332	36	3,655
1973-77	162	5	1,322	41	1,774	54	3,259
Total	1,893	18	4,440	42	4,308	40	10,645

Source : Foreign Investment Review Board, (1978).

Note : (a) Includes mining, quarrying and oil exploration and production.

Table 2.12: Outflow of Australian investment in foreign enterprises (including undistributed income), by country, 1968-1969 to 1977-1978 ($ million)

Year	E.E.C. U.K.	E.E.C. Other	New Zealand	USA and Canada	Papua New Guinea(a)	ASEAN	Other countries	Total
1968-69	17	(b)	14	1	25	(b)	5	63
1969-70	37	..	10	5	72	1	9	133
1970-71	1	..	21	5	25	4	12	68
1971-72	-10	2	26	11	53	9	22	112
1972-73	-2	21	24	20	(b)	7	44	114
1973-74	41	29	28	49	(b)	24	91	262
1974-75	2	-1	36	11	-6	39	19	99
1975-76	28	8	11	43	50	9	36	185
1976-77	31	9	72	60	26	17	43	257
1977-78(c)	69	-1	46	7	26	23	35	206

Source: Australian Bureau of Statistics, Foreign Investment, Australia 1978-1979. Cat. No. 5305.0.

Notes: (a) From January 1976 includes portfolio investment in Papua New Guinea. Prior to April 1975 excludes such investment. Between April and December 1975 includes transactions with Papua New Guinea only where amounts involved were denominated in Kina.
(b) Not available; included in 'Other Countries'.
(c) Direct investment only.
.. Less than $A 500,000.

CHAPTER 3. THE INFLUENCE OF DEVELOPING ASIAN COUNTRIES ON THE STRUCTURE OF AUSTRALIAN INDUSTRY

3.1 Introduction

An important influence on the global economy over the last two decades has been the emergence of a number of developing countries as significant exporters of manufactured goods to world markets. The development of the newly industrializing countries of East and South East Asia, which have been amongst the most successful in pursuing an export oriented strategy towards industrialization is of particular importance to Australia. The relative proximity of these countries to Australia together with the size of the Australian market, suggests that they will continue to be a more important factor for structural change in this country than on industry in Europe or North America.

In the following section, past developments in trade with the developing Asian economies is discussed, and a brief analysis is made of the influence of trade with developing countries on the structure of employment in Australian industry. Finally, in Section 3.3 the likely role of Asian developing countries in the future structure of Australian industry is examined.

Attention is focussed on ten developing countries in Asia. The ten countries included in the analysis are the five ASEAN countries (Thailand, Indonesia, Singapore, Malaysia and the Philippines), Hong Kong, Republic of Korea, Island of Taiwan, India and People's Republic of China. These countries provide over half of Australia's imports from developing economies and over half of Australian exports to the developing nations go to these countries (Table 3.1).

3.2 The significance of developing countries in Australia's recent pattern of trade

3.2.1 Recent trends in imports from developing countries

Table 3.2 shows that the share of Australian imports coming from the developing Asian countries increased from 6.6 per cent in 1968-1969 (ASEAN countries 3.2 per cent, Other East Asia 3.5 per cent) to 12.5 per cent in 1977-1978 (ASEAN countries 5.0 per cent and Other East Asia 7.5 per cent). The share of these countries manufactured imports increased even more rapidly. In 1968-1969 only 4.6 per cent of manufactured imports were from developing Asia (ASEAN countries 1.1 per cent and Other East Asia 3.5 per cent), whereas by 1977-1978 this had risen to 12.2 per cent (ASEAN countries 4.2 per cent and other East Asia 8.2 per cent).

Although the developing Asian countries' share of total Australian imports is still relatively small, the recent growth in imports from this region has been above average. The growth rates of imports in current prices for key trading regions are shown in Table 3.3. Over the period 1968-1969 to 1977-1978, the value of Australia's total imports from the developing countries in Asia at current prices grew at an annual average rate of 20.2 per cent. This compares with a growth rate from all regions of only 13.1 per cent a year. During this period the growth rate of manufactured imports was 29.2 per cent a year at current prices, corsiderably in excess of growtn rates from other key import regions, such as Japan, USA or the EEC.

To obtain the approximate rates of growth in the volume of imports into Australia, the value of imports was converted to constant prices using the price index for total imports into Australia.[1] The estimated rates are given in Table 3.4. Imports of manufactures from the ASEAN group of countries increased at more than 20 per cent a year at constant prices between 1968-1969 and 1977-1978, while such imports from the Other East Asian countries grew at 13.6 per cent a year in this period. There was a severe contraction in the rate of growth of these imports in the period 1973-1974 to 1977-1978 compared with the period as a whole. At the same time, however, the growth rate of total manufactured imports was actually negative. These trends in part reflect the introduction of import quotas and other temporary assistance measures for a number of industries in the mid 1970s.

3.2.2 The nature of imports from developing countries

Having demonstrated the significance of the developing economies in Australia's total imports and in particular the increasing importance of manufactured imports, attention is now turned to changes in these countries' share of imports at the industry level.

The structure of imports from developing Asia reflects an emphasis on resource based and labour intensive industries. Table 3.5 shows that these countries secured the highest shares of imports in the rural, textiles, clothing and footwear and wood and wood products industries. However, the increase in manufactured imports from developing Asian countries was distributed albeit unevenly across all broad industry groups. In every manufacturing category shown in Table 3.5, both the ASEAN and Other East Asia groups of countries increased their share of manufactured imports into Australia during the period 1968-1969 to 1977-1978.

In 1968-1969, 69.5 per cent of all imports from the ASEAN group of countries came from the rural and mining industries. By 1977-1978 this percentage had fallen to 23.1. The period 1968-1969 to 1977-1978 witnessed the expansion of labour intensive industries such as textiles and clothing and footwear among the ASEAN countries. These two industries combined represented 7.6 per cent of total imports from the ASEAN group of countries in 1977-1978 compared with only 1 per cent in 1968-1969. The ASEAN group of nations also deversified into the manufacture and export of products such as scientific equipment, electrical appliances, electronic equipment, industrial machinery, leather, rubber and plastic products. These products are significantly affecting the structure of imports from the ASEAN countries as evidenced by the increase in the region's import share for other machinery and equipment[2] and manufacturing n.e.c.[3]

Textiles and clothing and footwear are also a major element in Australia's imports from the Other East Asian countries. These two industries combined accounted for almost 50 per cent of imports from this group of countries in 1977-1978. However, recent evidence suggests that the comparative advantage in labour-intensive manufacturing is beginning to diminish for the more industrially advanced Asian countries such as Hong Kong, Taiwan and South Korea, as a result of recent rapid increases in their real wages. For example, the share of textiles in total imports from the Other East Asia group decreased by 17 per cent points between 1968-1969 and 1975-1976.

This group of countries is currently placing greater emphasis on more sophisticated techniques of production, wider deversification of markets served and a more differentiated set of products. From Australia's viewpoint these developments are reflected in the increased share of Other Asian countries in imports of other machinery and equipment (particularly electrical appliances, electronic equipment and industrial machinery), manufacturing n.e.c. (e.g. leather and rubber products) and fabricated metal products. The more developed Asian economies are moving away from traditional labour-intensive manufacturing to products which require the application of a higher level of skill and technology.

3.2.3 Australian market penetration by developing countries

Imports from developing Asian countries have affected all broad industry groups, but to different degrees. Some Australian industries are facing greater pressure for structural change than other inustries, as a result of import competition from this region. It is possible to distinguish those particular industries in which imports from developing Asian countries represent either an already significant share or an increasing share of the Australian market. The extent of market penetration to date is demonstrated in Table 3.6 which shows imports from developing Asia as a percentage of domestic sales. These statistics on import penetration need to be interpreted with care, for in some cases the imports include goods entering under by-laws which are not competitive with the products manufactured locally.

Two important features emerge from a consideration of this information. Firstly, for each of the manufacturing industry classes the developing Asian countries increased their share of the market between 1968-1969 and 1977-1978. However, only for two industries, textiles and clothing and footwear, did imports from this region account for more than 10 per cent of domestic sales in 1977-1978. Secondly, in 1968-1969 the Asian developing countries had captured only insignificant shares of the Australian domestic market for many products. By 1977-1978 there were several industries in which their previous market shares had more than trebled (e.g. chemical, petroleum and coal products, fabricated metal products and other machinery and equipment), although as mentioned earlier, in all industry classes imports from the region still represented only a small share of the total domestic market.

The extent to which imports from developing Asia have an impact on Australia's industrial structure depends to a large degree on whether these imports represent a new demand for imports or have simply replaced imports from other countries. There are obviously difficulties in isolating the new demand component of import growth from the replacement component, largely because it is difficult to determine what would have happened in the absence of increased imports from developing Asia. Having regard to this problem, an analysis was conducted within the Bureau of Industry Economics which compared the growth rates of imports from developing Asian countries with the growth rates of imports from all other sources over different time periods. From this analysis it was apparent that in all industries, except for knitting mills, imports from other countries have, in recent years, been able to at least maintain rates of growth comparable to those achieved in the late sixties and early seventies, and in most cases actually increased their growth rates significantly. These results suggest that the increase in developing Asian imports has largely represented a new demand for imports rather than a

replacement of imports from other sources. To the extent that this is true, it has placed adjustment pressures on import competing industries in Australia, at least in those industries where domestic production and imports are in direct competition.

3.2.4 Australian exports to developing countries

The developing countries have become more important in Australia's export pattern over the period 1968-1969 to 1977-1978, but the changes have not been as marked as they were on the import side. Table 3.7 shows the regional shares of Australia's total and manufactured exports over this period. Developing Asian countries became significantly more important as a market for total exports and also a more important market for manufactured exports. The share of the ASEAN countries in Australia's manufactured exports declined from 8.8 per cent in 1972-1973 to 7.6 per cent in 1977-1978. This decline was more than compensated for by an increase in the share of Other East Asia which rose from 5.0 to 7.4 per cent over the same period. In 1977-1978 the developing Asian market accounted for more of Australia's manufactured exports than Japan, USA or the EEC.

The commodity composition of Australia's exports to developing Asia is shown in Figure 3.1. As indicated in this figure, manufactured exports are heavily concentrated in two resource-based industries, food, beverages and tobacco and basic metal products. In 1977-1978 these two industries alone accounted for about two-thirds of Australia's manufactured exports and just over one-third of total Australian exports to the developing Asian countries.

3.2.5 Australia's balance of trade with the developing countries

Despite the rapid increase in imports from the developing countries in Asia, Australia continues to achieve a surplus in its balance of trade with the region. In 1968-1969 this surplus was $198 million, in 1972-1973 it was $361 million and in 1978-1979 $1026 million. Data on Australia's balance of trade for selected years over the period 1968-1969 to 1978-1979 are given in Table 3.9.

While there has been a marked increase in manufacturing activity in ASEAN countries, the range of goods produced is still fairly limited and confined primarily to consumer products and so have provided Australia with a market for exports of certain intermediate inputs such as metal products and machinery. This factor, combined with Australia's more accustomed role as a supplier of minerals, rural and manufactured food products, has enabled it to maintain a substantial trading surplus with the ASEAN group of countries over the period 1968-1969 to 1978-1979.

The value of exports to ASEAN countries in 1978-1979 was 71 per cent greater than the value of imports from these countries. Indonesia and Malaysia combined accounted for 65 per cent of the trading surplus with the ASEAN group of countries in that year.

Over the period 1968-1969 to 1975-1976 Australia moved from a surplus to a deficit position in its trade with Hong Kong and Taiwan. This trend continued in 1978-1979 with trade with Singapore also moving into deficit. Although the growth rate for imports into Australia from the Republic of Korea

was higher than for any other developing Asian country over the period 1968-1969 to 1978-1979, Australia's trade surplus with that country increased from $11.5 million in 1968-1969 to $52.1 million in 1975-1976 and to $312 million in 1978-1979. This was mainly due to an increase in Australia's share of the Republic of Korea's rapidly expanding import requirements. In 1978-1979 Australia's trade surplus with China was $296 million.

3.2.6 The influence of trade with developing countries on the structure of employment in Australian industry

Table A1.3 in Appendix 1 examines the employment changes associated with imports from developing Asian countries for the period 1968-1969 to 1975-1976. The overall impact on employment of such imports was negligible due to the small share of imports from Asia in total imports and the small effect of changes in the total import share. In the textiles, clothing and footwear, and wood, wood products and furniture industries, imports from Asia did make up a significant proportion of total imports and the import share effect on the changes of employment growth reflect this relative importance. For example, the estimated employment reduction in textiles and clothing and footwear, due to the growth in the market share from the developing Asian region was about 0.7 and 1.7 per cent per year, respectively.

The effects on employment growth of exports to developing Asia have also been estimated and are presented in Table A1.4. Two main findings can be distinguished. Firstly, the share of exports going to Asia in the majority of industries increased during the period 1968-1969 to 1975-1976. Secondly, the employment growth associated with the rising proportion exported to Asian countries has been small. There are, however, two notable exceptions to the general finding of an increase in the share of exports to Asia. Both the wood, wood products and furniture industry and the paper, paper products and printing industry reduced their share of exports from 12.9 per cent to 1.7 per cent and 31.4 per cent to 17.8 per cent respectively. Not surprisingly, the employment growth associated with these changes was negative, albeit small, amounting to only -0.01 per cent per annum and -0.03 per cent per annum respectively. The small size of the reductions being due to the relative unimportance of total exports to production in these industries.

3.3 The role of developing countries in Australia's future industrial structure

Previous sections of this chapter have demonstrated that, in recent years, export-led industrialization in Asia has provided an immediate source of pressure for change in the Australian industrial structure. These pressures were accompanied by a number of short-term adjustment difficulties, felt most strongly in labour-intensive industries. It can be argued that, over the next decade, the accumulation of human and physical capital, the international diffusion of new technology and escalating costs due to rising real incomes will inevitably give rise to further changes in the comparative advantage of a number of these developing Asian countries.

In the long-run, however, aggregate employment is unlikely to be threatened by changes in the division of labour which result from developing countries increasing the proportion of their resources devoted to manufacturing. The advanced countries, which receive most of these additional exports of manufacturers, will be able to, at least in part, offset employment losses in their more vulnerable import-competing industries by increasing their exports, either to developing countries or to third countries and through economic growth. This point is further developed later in this section.

It was observed in earlier sections of this chapter, that although changes in comparative advantage are likely to result in the developing Asian economies being increasingly able to offer a greater variety of light manufactured goods in competition with Australian industries, initially the major impact of these changes in comparative advantage is likely to be felt more in an intensification of existing pressures from imports. Shifts in comparative advantage will not necessarily reduce the pressure on Australia's labour-intensive industries. Imports from the region still comprise largely labour-intensive manufactures and as the newly industrializing countries (the Republic of Korea, Island of Taiwan, Hong Kong and Singapore) expand their industrial base and move out of these industries, the other countries in the region are likely to become more important exporters of labour-intensive manufactures.

In the time periods being considered in this report, therefore, the most obvious result of the impact of industrialization in Asia is that it will lead to a movement of resources in Australia, out of the more labour-intensive industries and into those industries making intensive use of capital, skilled labour and Australia's natural resources. This movement will be greater the fewer restrictions that are placed on imports from developing countries into Australia. As a corollary, a movement to lower protection could also result in increased off-shore investment in developing Asian countries by those industries affected.

In Appendix 1 it is shown that the overall impact on employment of imports from the developing Asian economies has been negligible in all but the following three 2-digit ASIC industries: Clothing and footwear, textiles, and wood, wood products and furniture. This analysis also found that a relatively fast rate of productivity growth and sluggish domestic demand were more important than increasing import competition in explaining the loss of employment in the textiles and clothing and footwear industries in the 1970s.

Furthermore, the low share of the domestic market held by imports from the developing Asian economies in all other industries, as shown in Table 3.6, suggests that quite large increases in these imports over the next decade would be needed before a noticeable impression was made on domestic employment in these industries. It follows then, that except in periods of economic downturn, the structural pressures arising from industrialization in Asia are likely to be manageable in all but a few industries. Some labour intensive industries will be subject to import competition from the developing Asian economies, which may create social and/or regional problems. This is particularly relevant for the textiles, clothing and footwear industries.

These industries employ a significant proportion of the total manufacturing workforce in Australia. Moreover, the labour force in these industries is often of a kind which is relatively immobile due to skill factors, regional problems and the relatively large proportion of female employment. It is for these reasons that the Government may act to reduce the rate of growth of imports into certain sensitive industries, at various times over the next decade. The Government has recently decided upon a long term policy for these industries. This policy has largely upheld the status quo in protection for these industries, as it was felt that lower levels of protection, by allowing a significant increase in imports, might jeopardize employment and production levels in the industries. Details of these policies are provided in Chapter 5.

While much attention has been given to the short-run consequences of increasing imports from the developing Asian economies, particularly in regard to employment, the gains from increased exports to these economies has until recently received relatively less attention. It has already been noted that any employment loss associated with increased imports from developing countries could normally be offset by increasing exports to these countries or to third countries.

The ability of the developed countries to increase exports to developing countries as a group is heavily dependent on the growth of the market in the developing countries. Table 3.9 shows that the aggregate real GNP of the eight developing Asian contries covered rose from $US 179 billion in 1973 to $US 237 billion in 1978, with all countries except India enjoying high rates of growth in real GNP. This compares with a GNP of $US 1779 billion for the US and $US 62 billion for Australia in 1978. These developing Asian economies therefore offer a market about three times the size of the Australian economy.

The Republic of Korea, Singapore, Island of Taiwan and Thailand have had the fastest growth in per capita GNP over the period 1973 to 1978. However, the size of per capita GNP varies greatly across developing Asian market economies and in all cases, except perhaps Singapore, is still well below that common to the developed countries. Nevertheless, these figures on output growth and rising material standards do highlight the burgeoning nature of the market in developing Asia.

Assessing the opportunities for the developed countries to make inroads into the expanding markets of developing Asia naturally depends on the rate of growth of import demand of these Asian countries. From Australia's point of view, it is also of particular interest to establish whether Australian exporters have succeeded in increasing their market share of imports into these countries. The increased competitiveness of manufactured exports from developing Asia and concomitant rising per capita incomes have allowed for a substantial growth in imports in most developing Asian countries.

The Industries Assistance Commission in its 1978-1979 Annual Report has sought to analyze the prospects for developed countries to export into eight Asian market economies (excluding China and India).[4] Some important features to emerge from this anlaysis were:

Hong Kong, South Korea, Singapore and Taiwan accounted for 20, 17, 16 and 15 per cent, respectively, of the total value of imports (excluding oil and crude petroleum) into the developing Asian market economies in 1976;

the major sources of imports in 1976 were Japan (30 per cent), the US (19 per cent) and EEC (15 per cent);

88 per cent of total imports in 1976 comprised manufactures, with the largest industry groupings (at the 2 digit ASIC level) being Other machinery and equipment, Food, beverages and tobacco, and Basic metal products. Over the period 1969 to 1976, in manufactures, only Other machinery and equipment, Chemical and coal products and Basic metal products increased their proportionate share;

Australia's share of total imports to the developing Asian market has changed little in recent years, comprising 3.3 per cent in both 1969 and 1978. The manufacturing sector as a whole fell from 2.9 per cent of total manufactured imports in 1969 to 2.7 per cent in 1976. The industries which have gained the highest shares of total imports into the developing Asian economies are coal, which accounted for 42.6 per cent, metallic minerals, 31.4 per cent, food, beverages and tobacco, 12.7 per cent and agriculture 7.4 per cent of imports in those categories in 1976

The rather disappointing perfomance of Australian manufacturing industries could be partly explained by the past pattern of Australia's exports to the region. These have comprised predominantly processed rural and mining products, while the major growth in import demand by the developing Asian countries has been for capital goods. Australia has been unable to make substantial inroads into the rapidly growing Asian markets for such products due to strong competition, especially from the large industrialized nations. Finally, Australian off-shore investment in the developing Asian region may, to some extent, have been of an import replacing nature against goods previously exported from Australia.

Nevertheless, over the last decade the rate of growth of Australian manufactured exports to developing Asia has outstripped the rate of growth of domestic output in the exporting sector.[5] This is due, in part, to the fact that Asian economies have been enjoying faster rates of income growth than either Australia or her other trading partners. Moreover, the growth in import demand in these developing Asian countries has outpaced GNP growth and growth in Australian exports of manufactures to the region has been faster than to her other major trading partners.[6]

The Industries Assistance Commission has recently sought to establish the main characteristics of those Australian manufacturing industries which are currently exporting to developing Asia, or have the potential to do so.[7] It was found that these industries were characterized by a high proportion

of tertiary qualified and managerial employees, a high capital intensity, low effective rates of assistance and a low degree of concentration. On the whole, these findings correspond well with a priori expectations, given Australia's relative abundance of physical and human capital. In addition, a combination of Australia's endowment of large low cost mineral and energy deposits, rising oil prices, the substitution of alternative energy forms for oil and the likelihood of increasing industrial capacity in developing Asia, augers well for Australian exports of mineral and energy products to the region.

The Industries Assistance Commission[8/] has also attempted to assess the impact on the Australian economy of exports to the developing countries through the use of the ORANI model.[9/] The method used by the IAC was to trace back the effects of current exports to the developing economies whilst holding other elements constant, so as to estimate the production and employment generated by these exports. These results include assessments of the indirect effects on sectors of the economy which do not export to the developing economies but supply inputs to those industries which do export. The 1975-1976 total contribution to employment of exports to the developing Asian economies was estimated to be 1.8 per cent of employment, or 88,100 people. About 4 per cent of employment and output in the rural sector, 3 per cent in the mining sector, 3 per cent in the manufacturing sector and 1 per cent in the services sector is attributable to these exports. These positive employment effects of exports are sometimes overlooked in analyzing the short-run effects of the rapid industrialization in Asia on Australia. This is largely because they are dissipated over a wide range of industries while the employment losses due to increased imports from the developing Asian economies are concentrated in a few industries and are therefore more obvious. Indeed, Johns and Metcalfe,[10/] in an attempt to quantify the total employment effects of trade in manufactures with the developing Asian countries, found, using a partial equilibrium analysis, that this trade resulted in a net direct employment loss of only about 0.1 per cent per annum. This analysis did not, however, consider the mining and agricultural sectors of the Australian economy, where the effects of trade with the developing Asian countries would be expected to provide some additional employment gain.

The Industries Assistance Commission model was also used to calculate projection of exports to the developing Asian economies in 1990 and the consequent contributions to employment and production.[11/] The two industries which should benefit most from the growth in exports are Agriculture and Basic metal products, which are estimated to increase their level of exports to the developing Asian economies by 47 and 39 per cent respectively over the next ten years. The increases in exports will have consequent effects on employment, but since only a small fraction of output is exported, the increase in employment is smaller in percentage terms than the increase in exports. Nevertheless, the increase in employment resulting from the growth of exports is expected to be 78,000 for the rural sector, 10,600 for the mining sector, 140,700 for the manufacturing sector and 149,100 for the services sector, making a total increase in all sectors of 378,400. Within manufacturing, the industries expected to experience the

greatest employment gains over the decade are Other machinery and equipment (21,900), Food, beverages and tobacco (26,600) and Basic metal products (18,700). In the service sector, Building and construction (38,100) and Wholesale trade (33,700) gain most in terms of additional employment.

These projections further support the contention that the long-run prospects for Australia's export industry in the developing Asian economies are strong.

Footnotes

1. Australian Bureau of Statistics, Balance of Payments 1975-76, Table 10 - Import Price Index. This method is somewhat rudimentary, given that the price indicators used are largely export or wholesale price indexes relating to the countries of origin.

2. Other machinery and equipment includes photographic, professional and scientific equipment, electrical and electronic equipment, industrial machinery and equipment.

3. Manufacturing n.e.c. includes leather and leather products, rubber products. plastic and related products, Other manufacturing and Miscellaneous manufacturing. Other manufacturing includes such items as ophthalmic articles, jewellery and silverware, brooms and brushes, signs, sporting equipment, writing equipment, musical instruments, wigs, etc.

4. Industries Assistance Commission, Annual Report 1978-79, Appendix 3.1.

5. Johns and Metcalfe, (1980) pp.12-13.

6. Bureau of Industry Economics, (1978) pp.60-63.

7. Industries Assistance Commission, op.cit., Appendix 3.2.

8. Ibid., Appendix 3.3.

9. ORANI is a large-scale general-equilibrium model developed for the IMPACT Project. IMPACT is a co-operative project between Commonwealth Government agencies and the University of Melbourne on the effect of economic, demographic and social changes on the structure of the Australian economy. ORANI is affected by the inter-relationships between industries; the choices consumers make about the goods they purchase; the allocation of investment funds between industries according to profitability; the choice consumers and producers face between buying goods from overseas or domestic sources; the choices producers face about the combinations of various types of labour and other factors of production to employ; and the effect cost changes have on the economy's ability to sell exports.

10. Johns and Metcalfe, op.cit.

11. The method used by the Commission was to determine to what extent the Australian economy would grow if exports to Asia expanded without alterations in existing standards of living. The projections assumed no bottlenecks in the supply of labour or physical assets, that the prices of factors of production were fixed and that sufficient overseas funds were available to enable the required physical assests to be constructed.

Table 3.1: Australia's trade with developing countries, 1978-79

	Exports		Imports	
	$m	%	$m	%
Indonesia	217.5		99.2	
Malaysia	330.7		152.6	
Philippines	165.8		76.9	
Singapore	264.1		277.7	
Thailand	112.8		35.4	
Total ASEAN	1090.9	7.7	641.9	4.7
China	437.6		141.6	
Republic of Korea	448.3		135.7	
Island of Taiwan	298.7		337.5	
Hong Kong	318.2		331.6	
India	112.6		104.0	
Total Other East Asia	1615.4	11.3	1050.4	7.6
Middle East	581.4	4.1	844.8	6.2
Africa	354.7	2.5	133.2	1.0
South America	108.9	0.8	79.5	0.6
Total Developing Countries	4600.2	32.3	2911.7	21.2
Total All Countries	14242.7	100.0	13751.8	100.0

Source: Department of Trade and Resources, Australia's Pattern of Trade, Part I: Direction of Trade, 1978-79.

Table 3.2: Australian imports by regional shares, 1968-69, 1972-73 and 1977-78

Region	Total imports			Manufactured imports		
	1968-69 %	1972-73 %	1977-78 %	1968-69 %	1972-73 %	1977-78 %
ASEAN countries (a)	3.2	2.5	5.0	1.1	1.9	4.2
Other East Asia (b)	3.5	5.5	7.5	3.5	5.6	8.0
Developing Asia (c)	6.6	8.0	12.5	4.6	7.5	12.2
Japan	12.0	18.1	19.2	13.3	19.2	20.7
USA	25.2	20.8	20.5	27.3	21.5	22.3
EEC	34.4	32.5	24.9	38.1	34.4	26.9
Other countries	21.8	20.6	22.9	16.7	17.4	17.9
Total imports	100.0	100.0	100.0	100.0	100.0	100.0

Source: Based on data supplied by the Industries Assistance Commission.

Notes: (a) Indonesia, Philippines, Thailand, Singapore, Malaysia.
(b) Hong Kong, Island of Taiwan, Republic of Korea, China, India.
(c) The ten countries specified above.

Table 3.3: Australian import growth rates by region, 1968-69 to 1977-78 (current prices)

Region	Total imports		Manufactured imports	
	1968-69 to 1977-78 % p.a.	1973-74 to 1977-78 % p.a.	1968-69 to 1977-78 % p.a.	1973-74 to 1977-78 % p.a.
ASEAN countries	18.1	20.3	28.3	26.7
Other East Asia	21.6	17.2	22.6	16.9
Developing Asia	20.2	18.2	26.3	19.8
Japan	18.4	17.3	18.3	17.2
USA	10.8	13.3	11.1	13.5
EEC	9.5	12.6	9.5	12.6
Other countries	13.7	17.7	14.2	15.7
All countries	13.1	15.4	13.4	15.1

Source: Based on data supplied by the Industries Assistance Commission.

Table 3.4: Australian import growth rates by region, 1968-69 to 1977-78 (constant prices)(a)

Region	Total imports		Manufactured imports	
Imports from	1968-69 to 1977-78	1973-74 to 1977-78	1968-69 to 1977-78	1973-74 to 1977-78
ASEAN countries	8.7	1.5	20.3	7.9
Other East Asia	12.5	-1.6	13.6	-1.9
Developing Asia	11.0	0.6	15.5	1.0
All countries	3.4	-3.4	3.7	-3.7

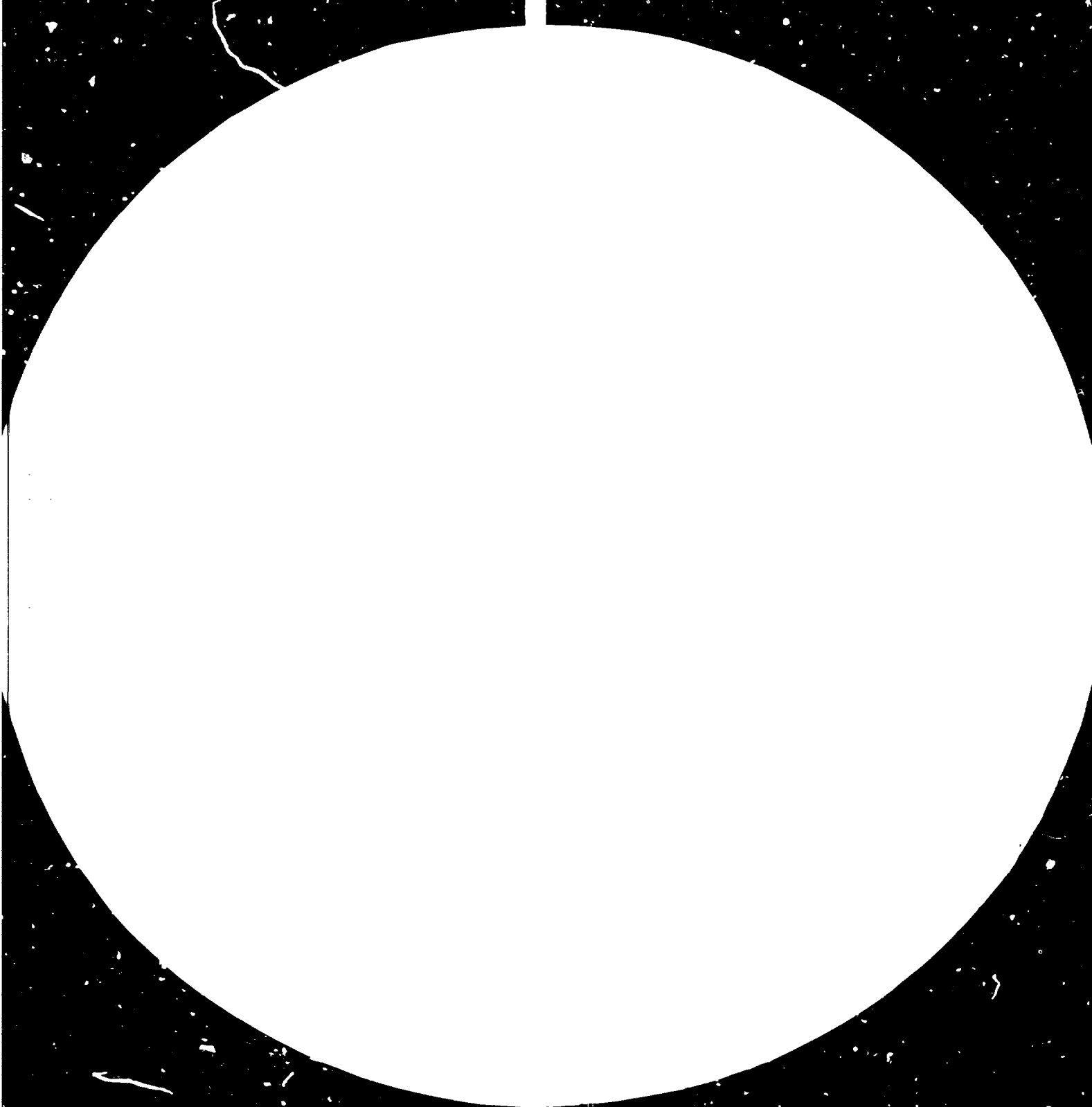
Sources: Based on data supplied by the Industries Assistance Commission; and Australia Bureau of Statistics, Balance of Payments, 1975-76, Cat. No. 5303.0, Table 10.

Note: (a) Reserve Bank Import Price Indexes used as a deflator.

Table 3.5 Australian imports, region of origin by industry, 1968-69 and 1977-78 (percentage of total)

Region		Rural	Mining	Food, beverages and tobacco	Manufacturing: Textiles	Clothing and footwear	Wood, wood products and furniture	Paper, paper products and printing	Chemical, petroleum and coal products	Non-metallic mineral products	Basic metal products	Fabricated metal products	Transport equipment	Other machinery and equipment	Manufacturing nec	Total manufacturing	All industries
ASEAN countries	1968-69	19.1	21.3	2.5	0.4	0.3	17.0	0.2	3.7	-	0.2	0.1	-	-	0.4	1.1	1.2
	1977-78	24.7	6.7	9.9	3.2	4.9	25.9	2.1	10.7	1.8	1.5	1.9	2.4	0.8	2.8	4.2	5.0
Other East Asia	1968-69	8.9	0.3	5.1	19.6	32.5	5.8	2.5	0.6	3.4	1.2	2.2	-	0.5	6.5	3.5	3.5
	1977-78	3.4	0.2	7.8	25.7	56.8	15.4	5.6	1.2	6.2	7.0	10.2	1.3	3.5	18.1	8.0	7.5
Developing Asia	1968-69	28.0	21.6	7.6	20.0	32.8	22.8	2.7	4.3	3.4	1.5	2.3	-	0.5	6.9	4.6	4.6
	1977-78	32.1	6.9	17.7	26.9	61.7	41.3	7.7	11.9	8.0	8.5	12.1	3.7	3.3	20.9	12.2	12.5
Japan	1968-69	1.9	0.6	10.1	28.8	12.3	5.2	4.9	7.9	22.9	37.5	13.5	15.0	8.6	16.9	13.3	12.0
	1977-78	5.5	1.3	3.8	21.5	4.7	1.5	8.2	6.3	25.9	49.7	20.7	42.6	24.2	17.7	20.7	19.2
USA	1968-69	15.0	4.5	10.6	7.0	6.5	16.1	18.1	28.1	15.5	12.7	23.5	42.0	33.1	21.7	27.1	25.2
	1977-78	12.4	1.1	13.4	10.7	3.2	15.1	21.1	18.6	13.8	9.3	20.1	22.3	32.1	19.8	22.3	20.5
EEC	1968-69	6.1	1.2	28.8	27.4	38.6	8.1	25.2	37.4	47.7	29.1	47.6	36.6	48.1	42.2	38.1	34.4
	1977-78	7.5	8.6	29.6	10.6	17.9	9.9	24.1	23.6	39.4	14.9	34.1	25.8	30.5	30.7	26.9	24.9
Other	1968-69	45.0	72.1	42.7	16.9	9.8	47.9	49.1	22.4	10.5	19.7	13.8	5.6	9.6	10.4	16.7	21.8
	1977-78	42.1	90.1	35.5	20.3	13.5	32.2	39.0	39.5	12.9	17.6	13.0	5.6	9.9	11.6	17.9	22.9
TOTAL	1968-69	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	1977-78	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : Original data supplied by Industries Assistance Commission.



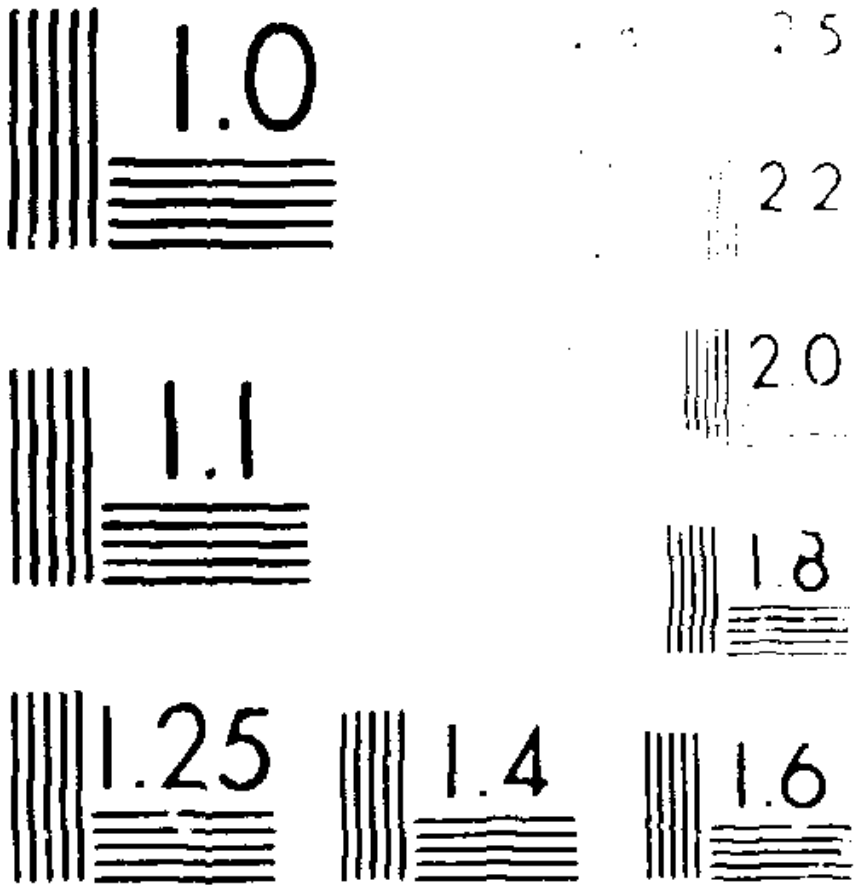

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Table 3.6: Australian domestic market, shares held by imports, 1968-69, 1975-76 and 1977-78 (percentage)

	Total imports	Imports from developing Asia(a)			Imports from all other countries		
	1977-78	1977-78	1975-76	1968-69	1977-78	1975-76	1968-69
Food, beverages and tobacco	7.7	1.4	1.0	0.4	6.3	5.2	4.4
Textiles	40.3	11.7	9.7	6.5	28.6	27.8	26.3
Clothing and footwear	22.8	14.1	11.7	2.4	8.7	8.8	4.9
Wood, wood products and furniture	10.9	4.5	4.2	1.8	6.4	5.5	6.3
Paper and paper products, printing	17.0	1.3	1.0	0.5	15.7	13.9	16.6
Chemical, petroleum and coal products	33.2	4.0	3.8	1.1	29.2	27.6	23.7
Non-metallic mineral products	10.4	0.8	0.5	0.3	9.6	8.6	8.7
Basic metal products	8.2	0.7	0.2	0.1	7.5	6.1	7.6
Fabricated metal products	11.3	1.4	1.0	0.2	9.9	8.4	8.5
Transport equipment	30.3	1.1	0.3	0.0	29.2	28.1	28.2
Other machinery and equipment	45.4	1.6	1.1	0.2	43.8	40.9	32.9
Manufacturing n.e.c.	27.0	5.7	4.2	1.4	21.3	21.4	19.3

Source: Based on data supplied by the Industries Assistance Commission.

Note: (a) Indonesia, Philippines, Thailand, Singapore, Malaysia, Hong Kong, South Korea, Island of Taiwan, China and India.

Table 3.7 Australian exports by regional shares, 1968-69, 1972-73 and 1977-78

Region	Total exports			Manufactured exports		
	1968-69 (%)	1972-73 (%)	1977-78 (%)	1968-69 (%)	1972-73 (%)	1977-78 (%)
ASEAN countries	6.4	6.1	6.7	9.7	8.8	7.6
Other East Asia	6.3	5.0	10.6	4.9	5.0	7.4
Developing Asia	12.7	11.1	17.3	14.6	13.8	15.0
Japan	23.6	29.3	28.5	10.2	15.0	13.1
U.S.A.	14.0	10.7	7.7	20.5	15.6	9.5
E.E.C.	25.2	19.2	12.6	21.9	19.2	11.7
Other countries	24.6	29.8	33.9	32.8	36.4	51.7
Total exports	100.0	100.0	100.0	100.0	100.0	100.0

Source: Based on data supplied by the Industries Assistance Commission.

Table 3.8: Australia's balance of trade with developing Asian countries, 1968-69, 1975-76 and 1978-79 ($ million)

Country	1968-69			1972-73			1975-76			1978-79		
	Exports	Imports	Balance of trade	Exports	Imports	Balance of trade	Exports	Imports	Balance of trade	Exports	Imports	Balance of trade
Indonesia	20.6	60.1	-39.5	71.8	13.3	58.5	159.9	24.3	135.6	217.7	99.2	118.5
Philippines	44.8	3.1	41.7	48.0	7.4	40.6	89.3	25.9	63.4	165.8	76.9	88.9
Thailand	23.8	1.7	22.1	32.9	7.2	25.7	44.3	20.8	23.5	121.8	35.4	86.4
Singapore	63.3	12.4	50.9	129.8	40.1	89.7	182.7	155.2	27.5	263.8	277.7	-13.9
Malaysia	63.6	29.5	34.1	95.3	36.7	58.6	171.9	79.8	92.1	330.6	152.6	178.0
ASEAN countries	216.1	106.8	109.3	377.8	104.7	273.1	648.1	306.0	342.1	1099.7	641.9	457.8
Hong Kong	71.0	40.6	30.4	92.5	79.6	12.9	146.4	216.0	-69.6	321.3	331.6	-10.3
Taiwan	26.3	11.7	14.6	68.8	53.3	15.5	111.3	134.2	-22.9	299.2	337.5	-38.3
South Korea	13.5	1.9	11.6	52.6	10.4	42.2	118.4	66.3	52.1	448.6	135.7	312.9
China	67.2	29.5	37.7	59.3	48.6	10.7	217.7	69.9	147.8	437.6	141.6	296.0
India	32.7	32.1	0.6	35.1	32.0	3.1	69.7	50.3	19.4	111.3	104.0	7.3
Other East Asia	210.7	115.8	94.9	308.3	223.9	84.4	663.5	536.7	126.8	1618.0	1050.4	567.5
Developing Asia	426.8	222.6	204.2	686.1	328.6	357.5	1131.6	842.7	468.9	2717.7	1692.3	1025.4

Source: Original data supplied by Industries Assistance Commission

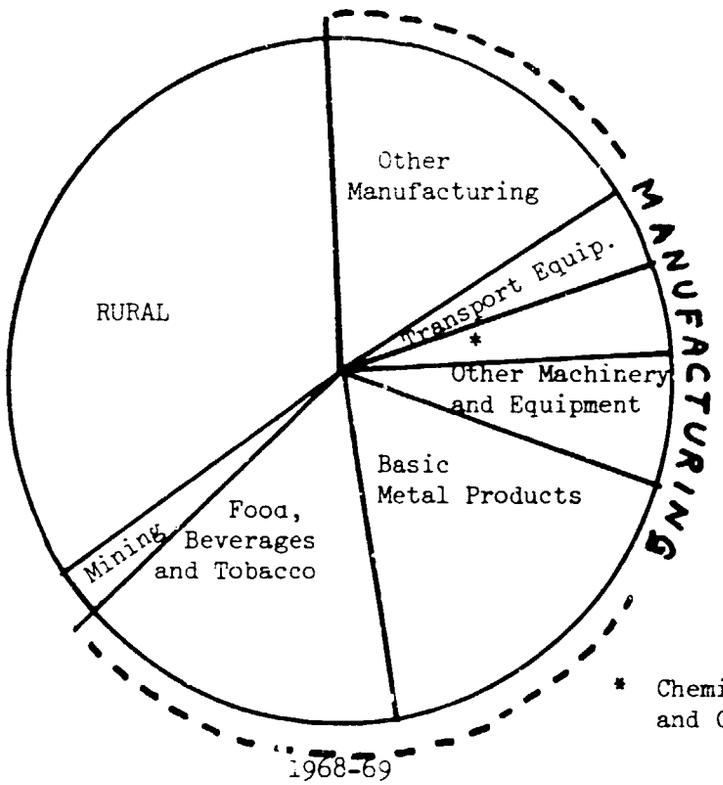
Table 3.9: Developing Asian countries (excluding China and Hong Kong), gross national product and per capita GMP, 1973 and 1978 (constant 1975 prices)

		India	Indonesia	Malaysia	Philippines	Singapore	Rep. of Korea	Island of Taiwan	Thailand	ASEAN	Total
Gross National Product ($US billions)(a)											
	1973	79.6	27.0	8.5	14.0	5.1	17.6	14.2	12.9	67.4	178.8
	1978	94.4	37.5	11.9	18.8	7.1	28.7	20.0	18.4	93.7	236.8
Average annual growth rate (per cent)											
	1973-78	3.4	6.6	6.7	5.9	6.6	9.7	6.8	7.1	6.6	5.6
Gross National Product per capita ($US)(a)											
	1973	138.3	209.3	753.3	347.8	2324.2	515.2	916.2	324.5	-	..
	1978	147.9	258.4	920.5	405.4	3055.8	775.0	1186.4	407.8	-	..
Average annual growth rate (per cent)											
	1973-78	1.3	4.2	4.0	3.1	5.5	8.2	5.2	4.6	-	-

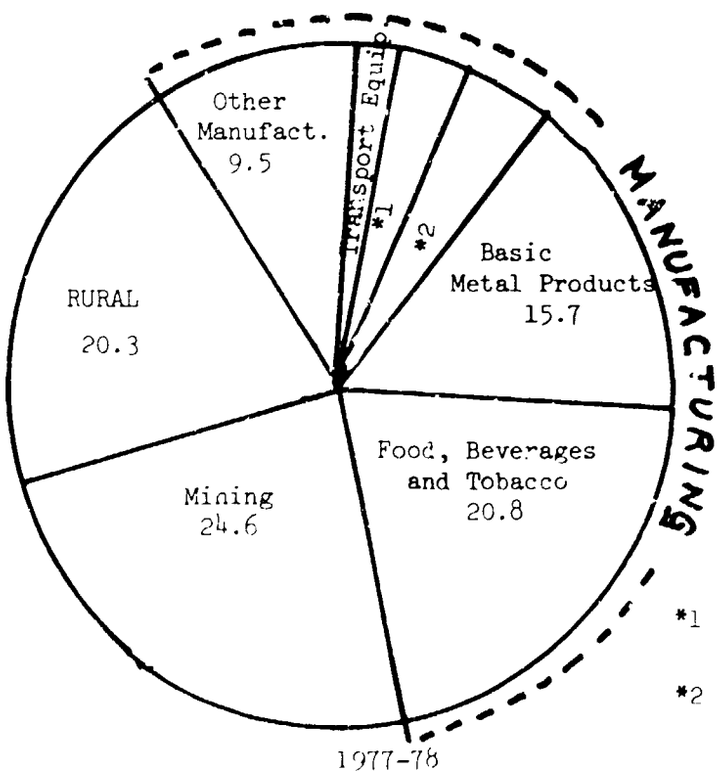
Source: International Monetary Fund, International Financial Statistics, March 1980.

Note: (a) Conversion to $US on the basis of period average of exchange rate for each country.

Figure 3.1: Australia's export shares by industry
(The composition of Australian exports to developing Asia by industry for the years 1968-69 and 1977-78)



* Chemical, Petroleum and Coal Products



*1 Chemicals, Petroleum and Coal Products 3.6

*2 Other Machinery and Equip. 3.9

SOURCE: Adapted from Bureau of Industry Economics (1978)

CHAPTER 4. TRENDS IN THE DEVELOPMENT OF AUSTRALIA'S EXPORT PERFORMANCE

4.1 Introduction

The following two chapters extend the analysis in the previous chapter of trade with developing countries to a more general analysis of trade pressures for structural change. In Chapter 4 the development of Australia's export performance is considered, while Chapter 5 addressesions concerning the influence of import penetration.

This Chapter begins by tracing Australia's past export performance and then analyses the international and domestic factors determining Australia's export development. Growth in world trade and the factors influencing Australia's ability to increase its share of world trade are examined. Of particular importance to Australia is the economic performance of the developing Asian economies and Japan. Australia's ability to increase its trade with these economies will have a crucial bearing on the future export performance of this country.

While Australian rural and mining industries direct a large proportion of their output to export markets, manufacturing industries are primarily concerned with the domestic market. During the 1970s awareness increased of the need for adjustment within the manufacturing sector to make it more competitive and export oriented. This awareness resulted in the instigation of government policies aimed at enhancing the development of export markets. increasing the efficiency of industries, reducing the level of protection and alleviating some of the adverse affects of structural change. These policies have had a significant impact on the export orientation of the manufacturing sector with exports as a proportion of turnover having increased from 9 per cent in 1968-1969 to 17 per cent in 1978-1979.

Finally, it is also noted that Australia's strong minerals and energy base is expected to lead to rapid growth in exports of certain mining and manufactured commodities over the next decade.

This general analysis of factors influencing Australian exports is followed by a more detailed sectoral analysis of possible export developments over the next decade. As a lead up to this, an attempt is made to identify those broad areas where Australian industry can be held to have a comparative advantage.

4.2 Past trends in export development

During the prolonged period of world economic expansion following World War II, all sectors of the Australian economy and their exports expanded significantly in absolute terms. That expansion has continued, albeit more unevenly, since the early 1970s, a decade of world economic downturn.

The composition of Australian exports has traditionally been quite different to that observed in most other industrialized countries and has tended to reflect the natural resource base underlying Australia's area of comparative advantage. While the ratio of manufactured exports to gross domestic product is low, the contrary is the case for the rural and mining sectors.

Over the post-war period the major change in the composition of Australian exports has been the increasing share of mining based exports at the expense of manufactured and more particularly rural based exports. Mining's share increased steadily over the entire period. Table 1.11 shows that mining's share almost doubled from 1968-1969 to 1975-1976, while the rural industries' share fell from 33.4 per cent to 23.9 per cent and manufacturing's share fell slightly from 54.5 per cent to 52.7 per cent.1/

The changes that have occurred in the commodity composition of exports have been associated with substantial changes in the direction of exports as shown in Table 4.1. There has been a considerable shift in the direction of exports away from the United Kingdom and other EEC countries to Japan and other Asian countries. The share of Australian exports going to Asian countries has almost doubled from 30 per cent of total exports in 1960-1961 to 55 per cent in 1977-1978. Over this period Japan has continued to provide an expanding market for Australian exports to the point where that country is now the single largest destination of Australian exports.

Of particular importance for Australia's future is the growing importance of the developing Asian economies as a market for Australian exports. As noted in Chapter 3, these countries now take a larger share of Australian exports than the traditional markets in Europe and North America. Moreover, the composition of Australian exports going to the developing Asian region has been markedly different from that going to our traditional markets, with strong growth occurring in manufactured exports. Between 1972-1973 and 1977-1978 the share of Australian exports of manufactured products going to the region increased significantly from 13.8 per cent to 19.8 per cent of total manufactured exports. Japan also became a relatively more important market for exports of Australian manufactured commodities, while there were sharp declines in the shares supplied to the EEC and the US.

During the post war period Australia has experienced strong export growth: taking the period as a whole, Australian exports of all broad categories of commodities except agricultural commodities have grown at least as fast as world trade for these categories. However, Australia's share of world trade has declined from almost three per cent in 1948 to just over one per cent in 1977. Despite the changes in the direction and composition of Australian exports noted above, Australia is still heavily dependent on exports of primary based commodities, whereas the fastest growth in world trade over the post war period has been in manufactures. Importantly, this decline in Australia's share of world trade would have occurred even if the growth in Australia's exports of agricultural commodities had increased in line with world growth over the whole period. Although Australia's share of world trade has been increasing in some primary commodities, most notably coal, sugar and alumina, this has not been sufficient to offset the effect of the low proportion of manufactured exports.

4.3 Factors affecting export development

In assessing the scope for future Australian export development, it is necessary to take into account the likely movements in a number of diverse factors. On the international side, growth in world trade, and Australia's ability to increase its share of this trade will have an important bearing on Australia's export development. In the long-term, growth in world trade will depend upon growth in population and income and the attitudes of countries towards increasing or decreasing their proportion of national output accounted for by trade. In the short term, the extent of this growth will be constrained by problems of unemployment and inflation currently pervading the industrialized world.

In Chapter I it was noted that the post war period saw a significant expansion in world trade, especially in mining and manufactures. However, since the onset of the world recession, the rate of growth of world trade has abated and recent projections point to only a moderate improvement in the real growth of world trade over the next decade.

From Australia's point of view, it is perhaps more significant to focus attention on trade prospects with Japan and the developing countries of East and South-East Asia. As was pointed out earlier in this chapter, Japan is Australia's single largest trading partner, and trade between Australia and the developing Asian countries is expanding rapidly. The proximity of these markets suggests that they will play an important role in Australian export development.[2/]

The composition of Australian exports to Japan has altered dramatically over the last two decades. There has been a fall in the proportion of agricultural products in total exports and a concomitant growth in the proportion of mining exports, particularly coal, metal ores and concentrates.

In 1977-1978 Japan accounted for about 32 per cent of Australian exports (Table 4.2). However, in recent years the proportion of Australian exports destined for Japan has declined slightly, although in absolute terms growth has continued at a high level.[3/] These changes have been caused by the world wide recession of the mid and late 1970s and the structure of the Japanese economy. In Japan, with a relatively greater fall in the rate of economic growth, the effects of the recession have been much sharper than in other industrialized countries.

It would appear that the constraints on long-term growth operating in the Japanese economy including a heavy reliance on imported energy forms and concerns over pollution, will preclude a return to the high real growth path of the past. Most estimates seem to suggest that a mild recovery to 7-8 per cent annual growth rate is likely.[4/] This would seem to imply that although the real value of Australia's trade with Japan is still likely to increase rapidly over the next decade, this increase will not match the levels achieved during the 1960s and early 1970s.

In addition, the long term comparative advantage of Japan is changing towards high technology fields.5/ This has led to an increasing emphasis being placed on the development of 'soft' technology, which will tend to reduce Japanese demand for Australian exports, particularly from the mining sector. Counterbalancing this, however, the types of environmental problems being experienced by Japan and Japan's reliance on imports of energy goods are likely to result in considerable growth in Australian exports of energy goods and processed mineral products.

Of increasing importance to Australia will be growth in the economies of East and South-East Asia. If the present rate of development in the nine market economies in these regions, namely Indonesia, Malaysia, Thailand, Singapore, Philippines, Island of Taiwan, Republic of Korea, India and Hong Kong continues, within four or five years they will be as important in world trade as Japan is now. The new emphasis on imports in China also offers Australian industry highly important additional export opportunities.

The evolving industrial structures in these Asian countries promises to generate demands which are distinctly oriented towards Australia's resource and technology base. A reasonably broad range of Australian exports, including processed minerals and fuels and some capital goods, could be developed for these markets. With the long term affluence in the region, opportunities for exports of processed foodstuffs and other consumer goods can also be expected although this will to some extent need to cater for the distinctive tastes of the region. However, continued strong growth in Asian developing countries is likely to depend on the opportunities for rapid expansion of their exports including those from labour intensive industries. A more detailed examination of these issues is contained in Chapters 4 and 7.

Australia may also be able to increase its share in world trade. Exports of most Australian manufactured goods currently account for only a small proportion of world trade and small increases in this proportion would represent a significant increase in Australia's manufactured exports. Efforts are currently being made to foster a more outwardlooking approach via such schemes as increased export incentives for manufacturing industries and the recently initiated Export Consciousness Campaign. Details of these export incentive schemes are furnished later in this section.

It is likely that Australia will have most difficulties in increasing its share of world trade in agricultural commodities. Australia has recently intensified its opposition to the trade restricting effects of agricultural protectionism, especially to the EEC's protection of its domestic agriculture. In addition, a major objective of Australian trade policy is to reduce the impact of EEC exports of subsidized surpluses and to overcome the arbitrary application of quota restrictions on beef imports by the United States and Japan.6/ It is not clear that substantial progress will be made in this direction, and for most of this study it will be assumed that the situation in regard to access to those markets will remain virtually unchanged over the coming decade.

On a more positive note, Australia's strong energy and mineral base is likely to lead to rapid growth in exports of certain mining and manufacturing commodities over the next decade. The manufacturing industries most likely to increase their share of the world market are those involved in the processing of mineral products, with the most striking case in point being aluminium. These developments are considered in more detail later in this chapter.

On the domestic front, growth in Australian exports is held back by the level of protection afforded import competing industries. The great difference between levels of assistance for local production and for export production that exists in Australia has hindered the development of outward-looking export oriented manufacturing industries, by encouraging industry to concentrate on production for the local market, rather than for export.

Any movement to lower the rate of protection to import competing industries over the next decade should also improve the scope for increased Australian exports. The Government is committed to seek a less complicated tariff structure, based on gradual progress towards lower and more stable levels than in the past. However, the Government has also stated that this will be heavily dependent on prevailing economic conditions. It is therefore likely that further progress in this direction will be gradual. In the following sections of this paper, it will be assumed that limited reductions are made in reducing the level of domestic protection over the coming decade.

In recent years there has been increased discussion and awareness of the need to encourage more efficient and export oriented industries. To this end, in 1978 a new Export Expansion Grants Scheme was introduced, while the existing Export Market Development Grants Scheme was extended to cover the travel and tourist industry. The Export Expansion Grants Scheme provides grants to manufacturers in respect of increases in the value of eligible exports in the grant year over the average value for the previous three years. In 1980-1981 the Government has budgeted for expenditure of $260 million in respect of these two schemes. While these schemes aim to redress some of the current imbalance in favour of import-competing industries, the subsidy involved is small in comparison with the protection accorded import competing industries.

4.4 Scope for increased export activity for major exporting industries

4.4.1 Empirical studies of Australian comparative advantage

In comparison with overseas, empirical studies of Australian comparative advantage are relatively scarce. The major research studies in this field in recent years have been carried out by Aislabie, Ip and Stanton (1975), Kasper and McMahon (1976), Parry (1978), the Bureau of Industry Economics (1978) and the Industries Assistance Commission (1979).

The Aislabie, et al., study[7] set out to determine the basic reasons for comparative advantage of Australian industries by testing the major theories of comparative advantage with Australian data. One method employed by the authors was to use input-output techniques applied to the 1962-1963 data. This analysis allowed for an estimation of the direct and indirect factor

requirements of Australian trade by using a multi-factor model (capital, labour and natural resources). Regression analysis was also carried out to ascertain the extent that trade patterns were related to certain industry characteristics. The report concluded that although no one theory was of itself an adequate explanation of Australia's trade flows, a number of theories considered together provide a reasonable picture of the basis of Australian comparative advantage. In particular, it was found that capital intensity, labour skills and renewable natural resources were all important in explaining the basis of Australia's comparative advantage. A major problem with the study is, however, the use of 1962-1963 input-output data. As was pointed out earlier, over recent years there has been a major shift in Australian trade patterns due to the emergence of mining exports. This means that the study underestimates the importance of non-renewable natural resources as a determinant of Australian comparative advantage. Moreover, the highly capital intensive nature of the Australian mining industry means that the importance of capital intensity is also under-estimated.

Parry's more recent study[8/] also attempted to relate trade flows to industry characteristics using 1972-1973 trade data and by characterising industries as exporting, subject to high import penetration, or non-traded. High import shares were found to exist in industries with high degrees of female employment, research and development expenditure and foreign ownership. Non-traded industries made intensive use of non-mineral natural resources and had high levels of effective protection and seller concentration. The small number of industries with high export to sales ratios precluded a meaningful analysis for this category.

The Kasper and McMahon analysis[9/] examined the determinants of Australian trade patterns for 1968-1969. It concluded that capital intensity and natural resource intensity were important determinants of Australian exports both to the world as a whole and to South-East Asia. On the imports' side the results, although less satisfactory, indicated that imports from South-East Asia tended to be in goods produced by unskilled labour.

The Bureau of Industry Economics[10/] examined the determinants of trade flows between Australia and the developing Asian economies for the years 1972-1973 and 1975-1976. The method used was similar to that of Kasper and McMahon, although on a more disaggregated industry basis. This study confirmed the results of the other three studies in that they showed that Australian export performance tended to be better for industries making greater use of natural resources. The results also showed that import competition from developing Asian economies is less important for industries using skilled labour in greater proportion.

The Industries Assistance Commission in a recent annual report,[11/] sought to determine the characteristics of the industries which have been most successful in exporting to developing Asian economies, or have the potential to do so. This exercise was undertaken using discriminant analysis on 4 digit ASIC data for the years 1968-1969 and 1975-1976. The results of tests showed that these industries are characterized by a high proportion of tertiary qualified and managerial employees, high capital intensity, low effective rates of assistance, a low degree of concentration and high tariff costs on inputs.

From these studies it appears that the basis of Australia's comparative advantage lies in the degree to which industries make relatively heavy use of capital, skilled labour and natural resources.

4.4.2 Minerals and energy

Since the early 1960s Australia has experienced a rapid growth in exports of unprocessed minerals. The share of this sector's exports to total exports increased from 3.9 per cent in 1960-1961 to 26.2 per cent in 1977-1978. Over the same period, processed mineral products increased their share from 3.8 per cent to 5.3 per cent.12/ The increase in unprocessed mineral exports was accompanied by a major diversification in the composition of these exports, the major new developments being the emergence of black coal, iron ore, bauxite and to a lesser extent nickel, as the major mineral exports, and the relative decline in the importance of copper, lead and zinc. The structure of the mineral industry has been radically altered by these developments as shown in Table 4.3.

Almost all of the increased minerals production since the early 1960s has been dependent on access to export markets. The percentage of mineral production exported rose from 31.7 in 1960 to 57.2 in 1975. By contrast, apart from the coking coal exported for steel production and exports of liquefied petroleum gas, the energy goods section of the mining industry has catered almost exclusively for the domestic market. This feature is likely to change in the future.

Australia's growing minerals production and trade has been closely linked with Japan's rapid industrial growth. All of the iron ore and coking coal mines opened since 1960 were developed initially to provide raw materials for the Japanese steel industry. There has been some diversification of markets, but Australia still depends on the Japanese market for almost 80 per cent of its export sales of these products, which in 1975-1976 accounted for 25.8 per cent by value of total Australian minerals and metals exports. While iron ore and coking coal offer the most striking examples of dependence on the Japanese market, Japan has also been a major buyer of a wide range of other mineral products and in 1975-1976 accounted for 28.4 per cent by value of Australian non iron ore and coal minerals and metals exports.

Assessment of future growth prospects of the mining industry depends crucially on the assumptions made about growth in world demand for basic mineral and energy products, availability of alternative supplies, future competitiveness of Australian processing, and the structure of international mineral markets. At the same time it is necessary to take account of Australia's prospective supply potential and the policy climate for mining developments which has changed since the 1960s.

Recent changes in world demand patterns for minerals and energy, brought about by restricted access to other sources of supply and increased prices, have placed Australia in a favourable position for the 1980s. Australia is endowed with relatively large low cost deposits of numerous mineral products. In particular, Australia has the world's largest reserves of bauxite and large reserves of iron ore, coal, lead, nickel, copper, uranium and mineral sands.

Australia's position as a net energy exporter is expected to be considerably enhanced over the next decade as indicated in latest Australian submission to the International Energy Agency. In 1977 Australia's production of energy products was 83.9 million tonnes oil equivalent (mtoe), of which 33.2 mtoe was exported. In the same year 11.4 mtoe was imported, giving net energy exports of 21.8 mtoe. Under the forecasts in the Australian submission to the International Energy Agency, by 1991, Australian energy production would grow to 385.1 mtoe, imports to 19.2 mtoe and exports to 109.9 mtoe, giving net energy exports of 290.7 mtoe.[13/] This represents an annual average growth of 20.3 per cent in net energy exports. These exports should be mainly in the form of black coal, uranium and liquefied natural gas (LNG). There are also possibilities for shale oil developments, though it is unlikely that any significant exports will derive from this source over the next decade.

Trade in basic mineral and energy products tends to be heavily influenced by geographic proximity of markets and ease of transportation. In the past, world trade in many basic mineral and energy products has often been restricted because of such factors as the large transport component of total cost and the volatility of some mineral and energy products. In Australia's case, this has meant that minerals and energy trade has been largely confined to the Pacific Basin region, especially Japan. There seems every reason to expect that Japan will continue to remain a major destination for Australian mineral and energy exports. Forecasts suggest, for example, that from 1977 to 1995 Japanese requirements of coal will grow from 58 million tonnes per annum to 178 million tonnes, for LNG from 8 million tonnes to 50 million tonnes and for nuclear power from 8 million KW to 70 million KW.[14/]

There are, however, substantial opportunities for diversification of markets. Within Australia's immediate region the developing Asian countries are expected to grow in importance as a market for Australian mineral and energy exports, as their industrial development proceeds. As Asian countries diversify their industrial base, they will be seeking larger amounts of basic mineral products as well as offering increasing opportunities for further processing in Australia. It is also likely that these countries will in future be seeking increased energy exports from Australia as oil becomes an increasingly uneconomic energy base from which to undertake industrial expansion.

This diversification of market opportunities for Australian mineral and energy exports, is however, likely to be wider than just the immediate region. Increased prices will, in themselves, encourage further development of Australia's mineral and energy resources. In particular, the rising cost of oil relative to other energy products provides Australia with increasing market opportunities for its considerable reserves of low cost coal, uranium and to a lesser extent LNG.

Over the coming decade, it is likely that the terms and conditions for foreign investment in Australia will continue to be important in attracting the capital investment needed to further develop Australian mining industries. It is unlikely that the total required investment will be forthcoming from indigenous sources mainly because of the limitations of the Australian capital market outlined in section 2.4. However, there appears to have been a permanent shift in public attitudes towards promotion of greater Australian ownership in the mining industry. At present government policy requires that companies developing new resource projects, except uranium, should seek 51 per cent Australian equity. In the case of uranium, the guideline is currently 75 per cent. The rigidity with which this rule is enforced will have a significant bearing on the rate of mining growth. The present government has interpreted the guidelines flexibly and if this trend continues it is unlikely that there will be any significant restraint on mining developments.

In recent years there has also been a growing awareness of environmental issues. In 1975 the Commonwealth Government passed an Environmental Protection Act. Under this legislation any proposed mining development must be supported with a detailed environmental impact statement, and the Commonwealth may refuse to grant export licences or may grant them subject to stringent environmental conditions. To date there have been only a few cases where environmental considerations have prevented new development taking place. However, increasing public awareness of the environmental impact of mining development can be anticipated over the next decade.

Land rights of Australia's aboriginal people is also likely to be an important issue over the next decade as considerable Australian mineral reserves are situated on aboriginal tribal lands. Commonwealth legislation already specifies that aboriginal consent is required for exploration and mining on aboriginal land in the Northern Territory. With increased aboriginal activism, at a growing public awareness of the need to protect the aboriginal heritage, this factor may be important in some mining developments.

While the growth prospects of many of Australia's exports of unprocessed mineral products are expected to remain strong up till 1990, this growth will be dampened somewhat by the movement towards increased processing of these mineral products prior to export. The reasons for this movement are further elaborated in the discussion on the scope for increased exports of manufacturing commodities in Section 4.4.

Given these general observations about likely future changes in the pattern of demand for Australian mineral resources, attention is now turned to a discussion of the prospects for particular commodities.

Coal

In recent years Australian exports of coal have risen markedly. Table 4.3 shows that from 1960 to 1977 exports of black coal rose from 10.1 per cent of total mineral exports to 29.5 per cent. In 1977 Australian exports of coal were 36.2 million tonnes, which accounted for 35.5 per cent of world trade in coal. This compares with exports of 29.2 million tonnes or 28.4 per cent of world trade in coal in 1974. Nearly 83 per cent of this was exported to Japan.[15] Coal exports currently consist mainly of coking coal.

The prospects for Australian exports of coking coal are heavily influenced by the same factors that govern world iron and steel production. It is probable that over the next decade Western industrial countries and Japan will be subject to constraints on further major expansions of their steel making capacity, due to factors such as their declining competitiveness relative to a number of developing countries, slow growth in demand and environmental concerns. This could result in a reorientation of the world's iron and steel making capacity, in part towards the industrializing nations of Asia. Australia would be favourably placed to meet the coking coal requirements of these countries, which themselves have only small coal resources.[16/] Moreover, even allowing for a fallback in growth of steel making capacity by traditional producers, it is likely that Europe and Japan will be seeking to increase their imports of coking coal. In Europe there are signs that further extraction of coal will be at high cost by Australian standards. Japan was responsible for about 121 million tonnes, or 6.1 per cent of world black coal imports in 1977. Of this about 26 million tonnes, or 22 per cent, was imported from Australia.[17/] Australia may be able to increase its share of Japanese import demand if, as anticipated, the availability of US coal is restricted in the future. It is also likely that the real price of coking coal will continue to rise steadily over the period to 1990,[18/] and that the relatively high value of coking coal will make it increasingly economic to ship larger proportions of mine output to Europe than has previously been possible, even allowing for the likely rise in transport costs.

The main area of growth in coal production, however, is likely to come from a rapid increase in exports of steaming coal. The likelihood of further increases in oil prices and OPEC production limitations will make steaming coal an increasingly attractive proposition for those countries that have become highly dependent on imported oil as a source of energy for industry. This would apply particularly to Japan and the industrializing nations of Asia, which have only limited domestic supplies of coal. Japan alone, because of its industrial capacity, could underwrite vast expansions of Australian steaming coal deposits. Western European coal demand has been forecast by the International Energy Agency[19/] to rise from 339 million tonnes in 1976 to 485 million tonnes by 1990. The imports component of this is forecast to rise from 55 million tonnes in 1976 to 153 million tonnes in 1990, with Australia's share of these imports projected to rise significantly. Australian coal has advantages over other sources, such as Poland, Canada and South Africa, because of its very low sulphur content, making it more attractive to pollution conscious customers.

Overall, the prospects for coal exports over the next decade appear to be very attractive. Recent Australian estimates suggest coal exports could reach 110 million tonnes per annum by 1990, made up of 60 million tonnes of coking coal and 50 million tonnes of steaming coal. This compares with total exports of 40 million tonnes in 1978, 34 million tonnes coking coal and only 6 million tonnes steaming coal. This represents an annual average rate of growth over the whole period of 8.4 per cent on total coal, 4.7 per cent on coking coal and 17.7 per cent on steaming coal. In real value terms these growth rates should be slightly higher reflecting the anticipated increase in the real price of coal.

Bauxite, alumina, aluminium

Australia has reserves of high grade bauxite totalling 4,400 million tonnes. This represents about one-third of total world reserves of processable bauxite. In 1978 Australian production of bauxite accounted for approximately 29 per cent of world production. Just over half of Australian bauxite production is exported, with about one third of production being exported to Japan and Europe alone.[20] That part of production not exported is refined to alumina in Australia. It is expected that Australia's share of world bauxite production will continue to increase well into the 1980s. The possibilities for further growth in Australian bauxite production are highlighted by a reserves annual production ration of 136 and a resources annual production ratio of 250.[21]

Australian production of alumina was 6.8 million tonnes in 1978 of which 92 per cent was exported.[22] Recent estimates suggest production should reach about 9.0 million tonnes by 1990, most of which will be exported.[23]

In the bauxite trade, Australian exports to the Atlantic region have been small due to the relatively high transport costs involved. However, as these countries have increasingly required processing of bauxite to alumina before export, the natural protection against Australian competition has been seriously eroded, since transport costs are a less significant proportion of alumina prices. This is likely to result both in an increase in Australia's share of world bauxite production and in an increasing proportion of Australia's bauxite being processed to alumina before export.

While Australia occupied a major position in world production of bauxite and alumina, its aluminium industry is small by world standards, currently accounting for less than 2 per cent of world production. Known expansion plans announced by the principal aluminium companies indicate that Australia's output will increase to about 6 per cent of current world capacity by 1990.[24] Recent estimates suggest that Australian aluminium production could increase from about 263,000 tonnes in 1978 to 1.6 million tonnes by 1990-1991. This would represent an average growth rate of 15 per cent per annum. Other estimates prepared by the Chase Manhattan Bank suggest that aluminium smelter capacity could reach 1.[illegible] tonnes by 1985 and 2 million tonnes by 1990.[25] Most of this increase in aluminium production would be to cater for export demands.

Consumption of aluminium in the Western world is forecast to rise significantly in the 1980s. Demand is espected to rise by an average of 4 per cent per annum during the first half of the 1980s, although if the general economic outlook brightens it could reach 6 per cent per annum.[26] In particular considerable scope for future growth in demand is likely to emerge due to the substitution of aluminium for steel, induced at least in part by rising energy costs and the lightness of aluminium compared to steel. The automobile and packaging industries are two examples where this substitution may take place.

The downturn in new investment in aluminium smelting capacity experienced by the major industrial countries in the 1970s is likely to continue into the 1980s, for three basic reasons. Firstly, aluminium production requires large amounts of energy, whereas most western economies are now faced with an increasingly uncertain energy future. Secondly, environmental problems resulting from aluminium production are likely to constrain any move by the major industrial nations towards increasing their capacity. However, Australia, as well as possessing large reserves of bauxite, has large coal and natural gas deposits suitable for electricity generation and, being sparsely populated, environmental constraints are not as pressing here as in the major industrial nations. Moreover, as transport costs become relatively less important at later stages of the production process, they represent a less serious impediment to market diversification for exports of aluminium than is the case for exports of bauxite and alumina, even allowing for rising transport costs over the period to 1990.

The types of developments outlined above are likely to mean that most Western industrial nations and in particular the United States and Japan will become significant importers of aluminium over the next decade.[27] Some estimates even suggest that total aluminium smelting capacity in the Western world will fall short of anticipated demand in the 1980s. Ultimately this would be reflected in price, although precise details on future price movements are complicated by the structure of the industry, dominated as it is by a small number of large transnational firms. Overall, it would appear that Australia is well placed to build up its aluminium production capacity over the next decade, catering predominantly for export markets.

Iron ore

Australian production of iron ore in 1978 was 82 million tonnes or about 9.5 per cent of world production. Of this, 75 million tonnes or 92 per cent was exported, representing about 21 per cent of total world exports of iron ore. Japan alone accounted for 72 per cent of Australia's exports.[28]

The future prospects for Australian iron ore exports are inextricably linked to growth in the world iron and steel industry but especially to Japan's iron and steel prospects. Forecasts suggest that world steel consumption will be between 1600 and 2000 million tonnes by the year 2000, compared to 681 million in 1976.[29]

Prior to the onset of the current recession, Japan's economic growth rate averaged close to 10 per cent per annum in real terms. Recent forecasts suggest that economic growth in Japan should average about 7 per cent in the period 1975 to 1990.[30] This reduced economic growth would seem to imply a lessening in future growth of iron and steel making capacity and indeed estimates of Japanese steel production have been revised downwards from the early 1970s. Recent estimates place steel production in 1985 at 140-150 million tonnes, with little likelihood of any further growth beyond this level.[31]

The most rapid growth in steel production is likely to occur in the Republic of Korea, Island of Taiwan and the Middle East. Australia has a strong advantage over competing suppliers of iron ore to these markets. However, although growing rapidly, the iron ore requirements of these countries are still small and will not represent a significant proportion of Australian iron ore sales for some years. In the European market, Australian exporters are at a competitive disadvantage relative to Brazilian suppliers, and it is not likely that sales to Europe can be expanded very rapidly.

Exports of iron ore from Australia are forecast to grow at between 3.5 to 4 per cent per annum from 1978.[32] This would place Australian exports at between 125 and 133 million tonnes by 1990.[33] Even allowing for some increase in the real price of iron ore, it is unlikely that growth in the real value of output will exceed 5 per cent per annum.

Uranium

Australia has approximately 18 per cent of the Western World's low cost uranium reserves - 292,000 tonnes at June 1979. With the increasing cost of oil as an energy source, the option of uranium based nuclear energy is being considered as an alternative. However, the prospects for Australian uranium are uncertain due to the current domination by political, environmental and land rights considerations. The total production capacity of the main uranium developments proposed would be about 27,000 tonnes and it is thought probable that Australia may still have substantial undiscovered reserves.[34] Recent projections suggest that Australia's uranium exports could reach 8,000 - 12,000 tonnes per annum by 1985 and be worth around $345 million by 1985-1986 and $552 million in 1987-1988 in current value terms and that they will expand steadily thereafter with real export value rising only slightly more rapidly than export volume.[35] However, the rate at which Australian uranium can be absorbed into the world market depends on the development of nuclear power generation, development and adoption of first breeder technology and the response of government to environmental considerations. A study of the feasibility of an Australian uranium enrichment industry is at present underway. The proximity of uranium reserves to relatively cheap electricity makes the location of enrichment facilities in Australia quite attractive.

Other mineral products

Apart from the products discussed above, the main minerals produced in Australia are copper, lead/zinc, nickel and mineral sands.

In the case of copper, increased domestic processing has been limited by the geographical dispersion of a number of small mines and by depressed world prices in the latter half of the 1970s. However, new discoveries at Roxby Downs in South Australia and Peko-Wallsend's Parkes project in New South Wales, may be sufficiently large to permit development of efficient integrated refineries supplying copper metal for export. Estimates suggest that growth in copper output will be mainly in respect of ores and concentrates,

exports of which are forecast to rise from 130,000 tonnes in 1978 to 400,000 tonnes in 1990. This represents an annual average rate of growth of about 9.4 per cent per annum. Exports of copper metals and alloys were 65,000 tonnes in 1978 and little change is forecast for exports of these over the next decade.

Australian processing is already well developed in the lead/zinc industry, and it seems likely that there will be some growth in mine and refinery production. Recent estimates suggest that for lead, an average annual growth of about 5 per cent can be expected over the next decade, while for zinc it is likely to be a more modest 1.5 per cent.

The main determinant of the growth in real export value of Australia's nickel will be the extent to which it is possible to refine a greater proportion of smelter products before export. Almost half of nickel mine production is currently refined into metal in Australia.

Expansion of rutile and ilmenite production may be limited by environmental measures. However, Australia's dominant position in the world market for rutile and its large reserves of ilmenite suggests that any restriction of output growth will, to some extent, be offset by more rapid increases in world prices. The prospects for future growth of other minerals examined in this section appear generally less promising than for coal or bauxite/alumina but, given the steady development of Australian processing, an overall rate of growth in real export value of 5-6 per cent per annum seems a reasonable expectation.[36/]

Gas

There have been substantial discoveries of natural gas in Australia and these have, so far, been developed to meet domestic demand. The large new North-West Shelf gas project, however, will depend heavily on export sales of LNG to provide the scale of market necessary for efficient development. Present expectations are that LNG exports will commence in the mid 1980s, and that these will add significantly to Australia's mineral export value.

The Government has already given approval for the export of 6.5 million tonnes of LNG per annum, and given the favourable outlook for further discoveries, there is good reason to expect that this could be increased. Current indications are that Japan will provide a significant overseas market for Australian LNG. The export potential of LNG will increase as the price differential between oil and gas widens, thereby encouraging substitution. Developments in LNG will require large and lumpy investment undertakings. Although a large part of the equity capital may be derived from Australian sources, some resort to overseas funds will almost certainly be needed. In addition, large investments are also required by the user country and this may place some restrictions on the export potential of natural gas.

4.4.3 Agricultural exports

As shown in Table 4.1, exports of processed and unprocessed agricultural products accounted for 45.1 per cent of total Australian exports in 1977-1978. Although this sector still remains Australia's dominant exporter, its share of total exports has fallen rapidly from 92.5 per cent in 1950-1951 and 75.5 per cent in 1960-1961. It is expected that this decline will continue through to 1990 though at a slower rate than that which occurred over the last three decades.

There have been substantial changes in the pattern of Australian rural export trade over the past decade, largely brought about by changing attitudes to imports of agricultural products in traditional markets. Since the early 1970s, the UK's membership of the EEC and the domestic and international consequences of the Community's Common Agricultural Policy (CAP) have forced many Australian rural industries to develop new markets (though it appears from Table 3.4 that some rerouting of agricultural products through Belgium, to the EEC, has occurred). A markedly different pattern of export trade has emerged and is still evolving. This is illustrated in Table 4.3. The importance of the UK market has declined while new markets have emerged in the Middle East and Asia.

The export dependence of the major rural industries has also been increasing though at different rates for different industries. Exports have expanded most rapidly for beef and veal, lamb, live sheep and barley. Those from the main horticultural industries have contracted substantially. For the dairy industry, reduced butter exports have been partly offset by increases in exports of other dairy products.

Growth in the world demand for Australian agricultural exports will depend on a number of factors, the most important being: growth in world population and income; government policies; tastes and changes in the price of agricultural commodities relative to other products.

Historically, world agricultural trade has been increasing relatively slowly at about three per cent per annum as compared with six per cent for minerals and ten per cent for manufactures. Projections by Leontief et al.,[37] anticipate a continuation of the slow rate of growth of world agricultural trade over the remainder of this century.

UN 'medium' population projections estimate an annual rate of population increase for the 1980s at about 1.0 per cent per annum for OECD countries and the USSR, 2.2 per cent per annum for Asian countries, 2.7 per cent for Latin American countries and 2.9 per cent per annum for African countries.[38]

Economic growth provides a small stimulus to demand for agricultural products. FAO estimates[39] indicate that the income elasticity of demand for all foods in developed countries at 0.08, and at 0.22 for animal proteins. In the developing countries the estimated income elasticity is higher at 0.22 for all food and 0.56 for animal proteins, though for these countries their demand for agricultural imports will depend on their availability of foreign reserves and their ability to increase domestic agricultural production. These estimates suggest a reduction in the growth of demand for food.

Government policies in relation to encouraging and protecting domestic agricultural industry are likely to be more important than growth in world demand in determining the scope for increased Australian exports of agricultural commodities. Present policies in most OECD countries effectively isolate their domestic agricultural sectors from outside influences. In most cases domestic prices are maintained substantially above world prices. This has resulted in a decline in the importance of imports and for some commodities, large exportable surpluses now exist. This is particularly relevant to the situation in the EEC. In the 1980s the exportable surpluses of the EEC countries seem likely to result in greater competition for Australian rural exports in third markets.

The Multilateral Trade Negotiations which were vital to Australia's export prospects for agricultural commodities have now drawn to a close. Although some general gains were achieved, the agricultural aspects of the negotiations did not result in as favourable an outcome as might have been hoped and Australian agriultural exports will continue to face problems of access to overseas markets in the 1980s.

Prospects for an effective opening up of agricultural markets in the EEC countries during the 1980s appear to be limited. With any decision to reduce protection to their rural industries likely to result in significant structural adjustment, there will be considerable domestic pressure to phase any such reductions over a long time period.

Australia's rural exports to the USSR and Eastern Europe have increased over the past decade. For the coming decade, wool appears to be the commodity with the best export prospects in these countries. Sales of meat, grain and possibly dairy products will probably expand but demand will fluctuate from year to year. In the Chinese market, wheat and sugar are the two commodities with the best growth prospects.

Countries in the East Asian and ASEAN region have become increasingly important markets for Australian rural products, and the potential for future growth is excellent. The continued economic expansion of these countries will be important in influencing their growth in agricultural exports. Table 1.10 shows that over the period 1968 - 1969 to 1975 - 1976 the proportion of Australian rural exports going to the developing Asian countries increased from 12.9 per cent to 15.5 per cent. In 1975 - 1976 these countries accounted for almost as large a proportion of rural exports as the EEC and over half the proportion accounted for by Japan.

The Middle East has emerged as a significant market for Australian agricultural exports. This market has considerable potential as the countries have only limited ability to expand domestic production and, with rising incomes, import demand will continue to expand. Live sheep and sheep meat seem likely to remain Australia's major exports to this market, with prospects also existing for increased exports of butter, cheese and wheat.

Turning to supply, most reports suggest that Australia has ample resources to support a greatly enlarged agricultural sector if economic conditions so justify. Utilisation of this potential will, however, require large investment in new land development, irrigation and fertilisers. Significant improvements in Australia's export trading situation would be needed before any notable expansion in the agricultural sector is likely to occur.

Data relating to expected levels of agricultural exports in 1990-1991 was provided by IMPACT,[40] and are given in Table 6.1. Derivation of these expected export levels relied heavily on the work of Freebairn[41] and on studies by the Bureau of Agricultural Economics. Underlying Freebairn's work are assumptions about the long-term rate of growth of income and population and rates of technical change and investment, together with estimates of world price elasticities of supply and demand. Freebairn's estimates were then adjusted by IMPACT to take into account the extensive transformation possibilities between agricultural commodities. Table 6.1 shows that, under these assumptions, over the period 1971-1972 to 1990-1991, sheep and cereal grains (by far the largest rural export industry), cattle, pigs and poultry, and forestry and logging, are projected to be the fastest growing export industries.

4.5 Scope for increased export activity for manufacturing industries

In examining the export prospects of Australian manufactures, it is necessary to separate resource based and non-resource based manufacturing commodities. Table 4.4 provides data on the composition of Australian manufactured exports over the period 1966-1967 to 1977-1978. In dissecting these exports, it is helpful to omit initially iron and steel, alumina and petroleum exports. The remaining exports ($1,163m or 46.3 per cent of total manufactured exports in 1977-1978) are the so called 'elaborately processed' manufactures. Expressed in terms of current prices, these have grown more than fourfold in the period since 1966-1967. The major items in the elaborately processed manufactures are: other manufactures; motor vehicles and parts; electrical machinery and equipment; non-electrical machinery; and optical, surgical and photographic goods. With the exception of motor vehicles, these items were also the fastest growing groups over the period since 1966-1967, although all (except optical, surgical and photographic goods) reduced their proportion of total manufactured exports.

The assessment of export prospects for these non-resource based manufacturing commodities, particularly at more disaggregated levels than the breakdown given in Table 4.4, is necessarily very speculative. Factor endowments in the production of these commodities are not readily identifiable and therefore the basis for long-run competitive advantage is less clear. The actual projected levels of exports of manufactured commodities used in this report are given in Table 6.1. In arriving at these export figures for 1990-1991, use was made of the increasing evidence that the growth of Australian manufactured exports have been positively related to the human capital intensity of the production process.[42] An indicator of skill intensity in 1990 was constructed by weighting normalised labour coefficients for 1990-1991 by the 1971-1972 vector of relative wages. Then comparatively high rates of growth were assigned to those manufacturing industries with high levels of skill intensity by 1990.

It is possible that there will be some increase in the rate of growth of exports of manufactures to New Zealand over the next decade. The Governments of both Australia and New Zealand are currently discussing ways in which closer union between the two countries could be accomplished. Though these discussions may result in some bilateral reductions in protection, such reductions are not expected to be large, as, except for a number of sensitive industries, bilateral barriers to trade between Australia and New Zealand have already been substantially eliminated under NAFTA for most manufactured commodities.

The growth prospects of resource based manufacturing and processed primary products exports appear to be good. Rising fuel costs will result in a greater concentration of mineral processing in countries such as Australia, where the minerals are located and energy is relatively cheap. Thus, although Australia's comparative advantage as a supplier of unprocessed minerals to the Atlantic region may be weakened by increasing fuel and, hence, transport costs, this may be more than offset by increased advantage in supplying processed minerals to that market. Similarly in Japan, there is likely to be a switch from imports of mineral products to imports of processed minerals as increasing energy costs, higher transport costs for minerals and relatively high pollution costs have steadily eroded the competitiveness of minerals processing in Japan. The rapid industrialization of South East Asian countries and moves by these countries to broaden their industrial base is also likely to provide for some increases in exports of processed minerals from Australia. Over the next decade, however, growth in exports of raw materials is likely to be more important, as the comparative advantage of these countries switches more to heavy industries, including metals processing.

The extent to which these changes are allowed to proceed without the introduction of protective devices by these countries will have important implications for the future pattern and direction of Australian exports of processed minerals.

The major resource based manufactures in Australia are iron and steel and alumina, with aluminium emerging as a potentially important export industry in 1990-1991. The growth prospects for exports of alumina and aluminium were considered in Section 3.3, while those for iron and steel are considered below.

Iron and steel

From Table 4.4 it can be seen that exports of iron and steel increased from $117.2 million in 1966-1967 to $439.1 million in 1977-1978, an almost fourfold increase over the period, although in percentage terms they fell from 25.3 per cent of manufactured exports to 17.5 per cent over the same period. In a recent report on the iron and steel industry, the Industries Assistance Commission assessed that the potential exists for a two- or threefold increase in production capacity in the next ten or fifteen years due to the intrinsic strength of the industry's comparative advantage in the Australian economic environment.[43/] It is unlikely, however, that any new major investment in iron and steel capacity will occur before 1985 and consequently exports are unlikely to increase significantly before that date. Indeed, exports of basic iron and steel products may decline during this period as domestic demand catches up with existing capacity. During the period 1985 to 1990 there is a possibility that new capacity will be installed, but this remains uncertain.

The conservative outlook therefore is that iron and steel exports in 1990 are likely to be around or slightly lower than the levels achieved in recent years.

4.6 Service sector export perfomance

Table 6.1 shows that service sector exports come predominantly from the transport and storage, and wholesale trade groupings of industries, which accounted for 89 per cent of total service sector exports in 1971-1972. Table 6.1 also shows that for a number of service industries, no exports were recorded in 1971-1972.

Over the period 1962-1963 to 1971-1972 service sector exports increased their share of total exports from 17.5 per cent to 23.5 per cent, with most of the growth occurring in the two industry groups mentioned above. The share of service sector exports is, however, projected to decline over the period to 1990-1991. This decline can be attributed to the strong export growth projected for other sectors of the economy, particularly for the mining sector, rather than an absolute decline in service sector exports.

The economic significance of tourism has been the subject of a recent Bureau of Industry Economics report.[44/] While no specific data was provided in the report on exports of tourism, the report did seek to estimate expenditure by overseas visitors using input-output categories for the year 1973-1974. These estimates show that the service sector is significantly affected by foreign tourism, the main industries benefiting being air transport (accounting for 48 per cent of expenditure by overseas visitors), restaurants, hotels, clubs (20 per cent), road transport (12 per cent), entertainment (7 per cent) and retail and wholesale trade (5 per cent). The Bureau's report forecast that by 1985 foreign tourism into Australia would increase dramatically. Under such a scenario it is likely that the export perfomance of these industries will also benefit as a result.

4.7 Conclusions

Both external and internal developments influence export performance which in turn exerts pressure for structural change in the economy. In Australia's case these developments include the growth in world trade, the rapid industrialization occurring in the developing Asian economies, the rising real price of oil and Australia's ability to increase its share of world trade, and on the domestic front a strong minerals and energy base and the Government's economic policies.

The broad shifts that occurred in the composition of Australian commodity exports in recent years were shown in Table 1.11, which shows the proportionate breakdown of Australian exports by industry for 1968-1969 and 1975-1976. The main features to emerge from this Table are the declining importance of agricultural products in total exports, the strong growth in exports of mining products and the slight decline in manufactured exports. These developments highlight the shift in Australian comparative advantage to non-renewable resource-based products. Broadly similar trends are likely to continue into the next decade and will have a crucial impact on the relative growth performances of different industries.

The outlook for exports of mineral and energy products appears to be especially strong. Firstly, Australia's endowment of large low cost mineral and energy deposits and changes in world patterns of demand for these products point to strong export growth in the future. Secondly, there are strong possibilities for export market diversification in minerals and energy, especially to devloping Asian economies and western industrial nations. Japan is also likely to remain a significant export market. Thirdly, the likelihood of rising real prices for mineral and energy products, reflecting both scarcity of supply and substitution for scarce resources, would act to stimulate exports of processed and unprocessed mining products.

The growth prospects for exports of minerals and energy products appear to be especially strong for coal and bauxite/alumina/aluminium. Lesser growth is forecast for iron ore, copper, lead, zinc and nickel, while, at this stage, the outlook for exports of uranium, LNG, mineral sands and shale oil is less certain, though potentially strong.

It was noted earlier that the importance of agricultural exports in total exports should continue to decline over the next decade. This should result from a continuation of the low growth in world agricultural trade and the protectionist policies regarding agricultural commodities in many of the industrialized countries. At the same time, however, some growth is expected in the East Asian, ASEAN, and Middle East markets. Overall, positive absolute growth is expected in agricultural exports.

Regarding the prospects for exports of manufactures, it was shown earlier in this chapter that these were strong for resource-based manufacturing commodities, but not so for a number of non-resource based manufactures, especially where these are associated with production processes making intensive use of unskilled labour.

Rising energy costs, changing comparative advantage and concerns over pollution have hightened the growth potential for exports of resource-based manufactures, especially to Japan and western industrial countries. There are also strong possibilities for increasing Australian exports of such goods to the developing Asian economies, where the combination of continued high economic growth, rising standards of living and the diversification of their industrial base over the next decade should raise their import needs considerably.

Within the manufacturing sector, the strongest possibilities for export development are forecast in basic metal and fabricated metal products. Other strong growth areas include the other industrial machinery and household appliances and chemical, petroleum and coal products industries. These industries are based on either Australia's strong non-renewable resource base or are intensive in their use of capital and skilled labour. Exports of food, beverages and tobacco products are expected to show some decline in overall importance relative to total Australian exports, due largely to the relatively slow growth in world demand for those products. Industries such as textiles, clothing and footwear; wood, wood products and furniture; paper, paper products; printing and publishing; glass, clay and other non-metallic mineral products and leather, rubber and plastic products and manufacturing n.e.c., which can be categorised as labour intensive and import-competing, are all expected to show declines in their small export shares. This indicates the degree of comparative disadvantage faced by Australian producers of these goods.

Exports of services were shown in this chapter to be mainly concentrated in the transport and storage and wholesale and retail trade industries. It was shown that although service exports will retain high export shares, some relative, though not absolute decline is expected over the next decade. This decline is mainly due to strong growth in mineral and energy exports.

This chapter has examined the importance of exports on likely changes in the Australian industrial structure over the next decade. It was shown that export development should reflect broad Australian comparative advantage and that this would induce pressures for change through differential industry growth rates. In the next chapter the influence of import competition on the future Australian industrial structure is analysed.

Footnotes

1. The share of manufactures is inflated by the inclusion of relatively simply processed rural and mining products. In 1977-1978 these constituted about two-fifths of exports from the manufacturing sector.

2. Seperate coverage of trade with the Middle East has not been included. While trade with this region has increased rapidly over the last ten years, this growth was from a low base, so that in 1979 the region's share of total Australian exports was less than 6 per cent.

3. Crawford and Okita (1979), p.1.

4. See Shirohara (1979), and Organisation for Economic Co-operation and Development (1979a)

5. Crawford and Okita (1979), p.39.

6. More recently, cheese is also being subjected to increased protectionism by Japan.

7. Aislabie, Ip and Stanton (1975).

8. Parry (1978).

9. Kasper and McMahon (1976).

10. Bureau of Industry Economics (1978).

11. Industries Assistance Commission, Annual Report, 1978-1979, Appendix 3.2.

12. Department of Trade and Resources, Economic Indicators, June 1978.

13. Scully, J. (1979), p.29.

14. Phillips (1980).

15. Department of Trade and Resources (1980), pp.12-13.

16. The only other possible supplier of coal to these countries in the immediate region would be China. The OECD Interfutures project suggests, however, that China will be only a modest exporter of energy (mainly coal) by the end of the century. See Organisation for Economic Co-operation and Development (1979a).

17. Department of Trade and Resources (1980), p.13.

18. See Smith (1978), p.142. The author argues that because the price of coking coal will be closely related to the price of oil, its price can be expected to rise steadily.

19. Financial Review, 21 February 1980, p.10.

20. Department of Trade and Resources (1980), pp.6-7.

21. The reserves/production ratio is an expression of the physical deposits able to be commercially developed at this time. The resources/production ratio is a measure of the theoretically recoverable deposits which are either geologically proved but considered uneconomic at this time or are awaiting further appraisal.

22. Department of Trade and Resources (1980), pp.6-7.

23. Department of Industry and Commerce (1979). This estimates that Australian alumina production should reach 8.5 million tonnes by 1985.

24. Ibid., p.1.

25. Financial Review, 4 March 1980.

26. Financial Times, 9 January 1980, p.15.

27. Recent estimates by the Chase Manhattan Bank suggest that US consumption of aluminium will grow by 5 per cent per annum during the 1980s, but that domestic production will grow by only 1 per cent per annum. It is estimated that Japan will need to import over 1 million tonnes of aluminium by the early 1980s.

28. Department of Trade and Resources (1980), p.22.

29. Organisation for Economic Co-operation and Development, op.cit., p.262.

30. Ibid.

31. Smith, op.cit., p.141.

32. Ibid.

33. Export prospects will be reduced by the substitution of aluminium for steel, as was pointed out in the discussion on aluminium prospects.

34. Ranger Environmental Enquiry (1977).

35. Bureau of Mineral Resources (1979).

36. Smith, op.cit., p.144.

37. W. Leontieff, et al (1977).

38. Quoted in Freebairn (1978).

39. Ibid.

40. The IMPACT project is a Commonwealth Government inter-agency project in co-operation with the University of Melbourne, to facilitate the analysis of the impact of economic, demographic and social changes on the structure of the Australian economy.

41. Freebairn, op.cit.

42. See for example, sub-section 4.4.1 of this report.

43. Industries Assistance Commission (1979).

44. Bureau of Industry Economics (1979c).

Table 4.1 : Direction of trade, Australia, 1950-51, 1960-61, 1970-71 and 1977-78 (percentage of total exports)

Destination of exports	1950-51	1960-61	1970-71	1977-78[a]
United Kingdom	33	24	11	4
United States	15	8	10	11
EEC (excluding the United Kingdom)	23	16	9	10
Asia				
Japan	6	17	26	32
Developing Asian market economies	3	6	10	13
Other Asia	3	7	3	10
Total Asia	12	30	39	55
Other countries	17	22	31	20
Total trade	100	100	100	100

Source : Department of Trade and Resources, Australia's Pattern of Trade, Part 1 : Direction of Trade, relevant years.

Note : (a) Preliminary figures subject to revision which are compiled from tabulations provided by the Australian Bureau of Statistics.

Table 4.2: Shares of commodities in total mineral production and in exports of mineral products: Australia 1960 and 1975

Commodity	Percentage of mine production (a) 1960	1977	Percentage of mineral exports (b) 1960	1977
Black coal	35.0	34.3	10.1	29.5
Brown coal	4.4	1.5	-	-
Crude oil	-	8.4	-	0.3
Natural gas	-	1.9	-	-
Liquid petroleum gas	-	n.a.	-	2.8
Iron ore(c)	3.1	19.0	4.1	20.1
Tungsten	0.4	0.9	1.4	0.8
Nickel	-)	n.a.	-	5.3
Manganese	0.2)	1.5	1.0	n.a.
Bauxite	-)	n.a.	-	-
Copper	16.2	4.1	21.8	3.1
Lead	13.1	4.3	32.8	4.9
Zinc	4.9	3.0	13.6	3.2
Tin	1.3	1.9	0.2	1.3
Titanium	2.5	-	7.0	n.a.
Zircon	0.6	0.8	2.1	0.8
Salt	0.6	-	0.2	0.6
Gold	10.1	1.5	n.a.	0.9
Total(d)	92.4	93.3	94.3	97.5

Source: Smith, B. (1979), p.131, and Bureau of Mineral Resources, (1979).

Notes: (a) Value of mine production as a proportion of the total ex-mine value of Australian minerals production (excluding construction materials).
(b) Value of exports of ores and concentrates plus smelter and refinery products as a proportion of Australia's total exports of minerals and primary metals.
(c) Exports include exports of crude iron and steel - there were no exports of iron ore in 1960.
(d) Export of minerals and primary metals calculated net of exports/imports of gold bullion.
n.a. Not available.

Table 4.3: Export pattern for Australian agricultural products(a)

Commodity	Three years ended 1967-68			Three years ended 1977-78		
	Average exports	Shares of three leading markets(%)		Average exports	Shares of three leading markets(%)	
		Market	Share		Market	Share
Beef and veal	263	USA	71	651	USA	46
		UK	19		Japan	11
		Japan	4		USSR	6
Mutton	90	Japan	35	156	Japan	56
		USA	30		Iran	9
		Canada	15		Korea Rep. of	9
Lamb	13	UK	40	37	Iran	57
		Canada	28		Jordan	7
		USA	10		USA	7
Live sheep	327	Kuwait	47	3430	Iran	54
		Singapore	34		Kuwait	22
		Malaysia	8		Saudi Arabia	15
Butter	91	UK	73	48	Bel/Luxembourg	14
		Malaysia	5		Saudi Arabia	9
		Singapore	3		Hong Kong	7
Cheese	28	UK	38	43	Japan	55
		Japan	25		Saudi Arabia	12
		Philippines	9		USA	7
Skim milk powder	37	Japan	25	81	Japan	21
		Philippines	14		Philippines	21
		Thailand	13		Thailand	15
Wool	656	Japan	34	630	Japan	31
		UK	11		USSR	12
		Italy	10		Italy	9
Apples	138	UK	48	48	UK	33
		Germany F.R.	25		Germany F.R.	14
		Sweden	7		Singapore	12
Pears	33	UK	45	27	Singapore	20
		France	13		Hong Kong	20
		Sweden	9		Bel/Luxembourg	14
Dried vine fruit	70	UK	39	42	Canada	30
		Canada	26		Hong Kong	21
		NZ	8		Germany F.R.	14
Canned fruit	132	UK	63	74	UK	37
		Germany F.R.	17		Canada	16
		Canada	10		Japan	16
Barley	256	Japan	35	1790	Japan	37
		Italy	22		Bel/Luxembourg	12
		UK	8		Germany F.R.	9
Wheat	6530	China	34	9080	China	24
		UK	9		Japan	12
		Japan	8		Egypt	12
Sugar	1520	Japan	34	2340	Japan	28
		UK	29		Canada	21
		USA	11		USA	15

Source: Hussey, D., (1979).

Note: (a) All commodities except live sheep measured in kilo tonnes. Live sheep data is shown in thousand head.

Table 4.4 : Composition of Australian manufactured exports (excluding re-exports) 1966-67, 1974-75 and 1977-78 (current prices f.o.b.)

Commodity	1966-67		1974-75		1977-78	
	$ mill	%	$ mill	%	$ mill	%
Iron and steel	117.2	25.3	375.1	20.0	439.1	17.5
Petroleum	29.9	6.5	161.1	8.6	239.8	9.6
Other -						
Food, drink and tobacco[a]	16.2	3.5	29.4	1.6	37.0	1.5
Yarns, textiles and apparel	16.4	3.5	41.4	2.2	42.1	1.7
Pigments, paints and varnishes	4.4	1.0	10.6	0.6	14.2	0.6
Vehicles and parts	47.9	10.3	145.7	7.8	99.1	3.9
Electric machinery and equipment	18.0	3.9	82.8	4.4	76.8	3.1
Non-electric machinery	47.7	10.3	203.4	10.8	222.7	8.9
Rubber and leather	2.7	0.6	9.6	0.5	9.8	0.4
Paper, stationery	15.0	3.2	37.3	2.0	44.5	1.8
Optical, surgical and photographic goods	9.5	2.1	38.9	2.1	73.2	2.9
Alumina)	49.2	10.6	297.9	15.9	667.6	26.6
Other chemicals)			165.3	8.8	243.6	9.7
Other manufactures	88.6	19.1	277.0	14.8	300.7	12.0
Total manufactures	462.7	100.0	1,876.1	100.0	2,509.8	100.0

Source : Department of Trade and Resources, Exports of Manufactures, various issues

CHAPTER 5. THE INFLUENCE OF IMPORT PENETRATION ON THE STRUCTURE OF AUSTRALIAN INDUSTRY

5.1 Past trends in import penetration

The value (in current prices) of Australian imports of goods increased from $3,384 million in 1968-1969 to $11,031 million in 1977-1978. In 1977-1978 approximately 92 per cent of Australia's imports consisted of manufactured goods, while imports of rural and mining goods accounted for approximately 3 and 5 per cent of total imports respectively.[1]

The impact of imports on the manufacturing sector has been uneven, and in recent years many manufacturing industries have experienced significantly increased import penetration. Data on the import penetration experienced by Australian mining and manufacturing industries over the period 1968-1969 to 1977-1978 is shown in Table 5.1.

For manufacturing as a whole, the share of the market held by imports increased from 17.5 per cent in 1968-1969 to 22.9 per cent in 1977-1978, with the largest increases occurring in the clothing and footwear, textiles, machinery and household appliances and the chemicals, petroleum and coal products industries.

The differential impact of import competition is even more obvious when the figures are further disaggregated (Table 5.2). The import share of the Australian market rose over the period 1968-1969 to 1976-1977 by more than 10 percentage points in twelve industries, namely, knitted goods, man made fibres, yarns and fabrics, clothing, footwear, television sets, radios, communication and electronic equipment n.e.c., household appliances n.e.c., agricultural machinery and equipment, construction, earthmoving and materials handling machinery and equipment, leather products, petroleum refining, rubber products and certain other manufacturing items including jewellery and silverware and sporting goods.

Over the last decade or so, important changes have also been apparent in the sources of import competition experienced by many manufacturing industries. In particular, manufactured imports from Japan have risen dramatically as a proportion of total manufactured imports. At the same time, import competition from the developing Asian economies in many labour intensive manufactures has also increased sharply. These developments were discussed in more detail in Chapters 1 and 3.

Service sector imports have been traditionally low, with most service industries receiving almost no imports over the past ten years. The only service industries in which imports have accounted for a large proportion of the domestic market are the water transport and air transport industries. Over the period 1968-1969 to 1974-1975 import shares in the water transport industry ranged between 9 and 22 per cent, and for air transport between 27 and 44 per cent.

Of the other service industries, the investment, real estate and leasing, and entertainment and recreational services industries are the only ones in which the proportion of imports to domestic production has been significant, though less than 10 per cent in each case. Import shares of all other services industries have traditionally been below 3 per cent.[2]

There are a number of factors likely to influence the future level of import penetration experienced by industry. In Section 5.2 the effect of the Government's industry assistance measures are examined. Section 5.3 compares the effect of changes in comparative advantage, with particular emphasis on industrial development in Asia. In Section 5.4, the effect of the interrelatedness of exports and imports is addressed. Finally in Section 5.5, some conclusions are drawn on the likely changes in import penetration up to 1990 and an attempt is made to identify those industries likely to experience significant pressure.

5.2 Industry policy

5.2.1 Historical perspective

Government policies have had a strong influence on the development of manufacturing industry in Australia. In the 1930s when Australia was still producing a relatively limited range of manufactured goods, the tariff was the principal means of assisting the growth of import-competing industries. World War II provided a significant stimulus to the growth of the domestic manufacturing sector.

Much of the engineering industry and many new manufacturers of metal products and machine tools came into existence to meet the requirements of the war effort. The expansion of industries manufacturing consumer goods was helped by the curtailment of imported supplies. Thus Australia emerged from the war with an enlarged, more sophisticated and more diversified manufacturing sector employing, in 1947, about 27.6 per cent of the total workforce.

Between the end of World War II and the early 1960s, exchange controls and quantitative import restrictions had the effect of maintaining protection for the import-competing industries. The primary purpose of these controls was to assist the balance of payments and maintain the exchange rate. Nonetheless, they tended to stimulate further diversification and import-substitution in the manufacturing sector.

With the ending of import licensing in 1960, the tariff again became the dominant instrument of protection. However, the tariff structure at this time and the guidelines for tariff-making used by the Tariff Board were largely inherited from the 1930s, when economic circumstances were vastly different. The degree of integration among the domestic industries had increased considerably, so that the effect of a particular tariff upon the costs of other local manufacturing activities could no longer be neglected. Moreover, full employment had been maintained virtually without a break since the War, with the result that, by the late 1960s, more attention was being paid to the need for an efficient allocation of resources, and not merely to the promotion of new, possibly high-cost employment opportunities.

In addition to these considerations, the growing importance of the mineral industry and the steadily increasing share of the service sector in GDP also suggested the need for some reexamination of long-term industry policy. Since the early 1960s, several Government appointed Committees of Inquiry have reported on aspects of industry policy, including protection and other measures of assistance. The first of these

was the Committee of Economic Inquiry[3] whose wide-ranging report in 1965 included some important suggestions for the reform of tariff policy. A secc. ·as the report by Sir John Crawford on a Commission to Advise on Assistance to Industries which led to the establishment of the Industries Assistance Commission (IAC) with broader powers than the Tariff Board which it replaced. The two most recent Committees, the Committee to Advise on Policies for Manufacturing Industry[4] which reported in 1976, and the Study Group on Structural Adjustment[5] which reported in March 1979, were concerned specifically with the problems and opportunities for the manufacturing sector. The Australian Government has acted to implement some of the recommendations of the two recent Committees, although some aspects of the Report of the Study Group on Structural Adjustment are still under consideration at the time of writing.

In 1977 the Government itself released a White Paper on Manufacturing Industry which remains the most recent official statement of Australia's industry policy. The White Paper indicated the Government's commitment to a long-run approach designed to achieve

> 'a less complicated tariff structure, based on gradual progress towards lower and more stable tariff levels than in the past'.[6]

At the same time it was indicated that temporary assistance might be necessary to avoid disruption, particularly in the current period of lower economic activity. The White Paper also provided a general indication of the Government's attitude towards the problems of specific industries, such as motor vehicles, clothing, textiles and footwear. It noted that where specific policies were needed, support should be provided for a defined period during which real efforts should be made by the industry concerned to improve its structure and efficiency. This is discussed in greater detail in section 4.2.3.

The remainder of this section focuses on some of the specific measures which the Government has introduced in recent years to deal with the problems of structural adjustment. These include tariff policy, industry specific policies (or sectoral policies) and various other planks in the Government's industry policy structure which have a bearing on the degree of import competition faced by Australian industries. Such policies are an important determinant of the level and direction of imports into Australia and are therefore a necessary consideration in this chapter which seeks to examine the influence of imports on Australia's future industrial structure.

5.2.2 Protection policy

Assistance to meet import competition in Australia is mostly given in the form of tariffs though other measures such as import licensing, bounties and subsidies are also used, albeit to a lesser extent.

Over the seventies, Australian tariffs and tariff-making underwent several important changes. In 1971 the Government announced that the Tariff Board[7] would undertake a systematic Tariff Review. This review was designed to examine high tariffs of long standing. It covered activities accounting for about 35 per cent of value added in the manufacturing sector. By June 1978 inquiries covering about 20 per cent of value added in the manufacturing sector had been completed.[8]

Reductions in long-term assistance arising out of the Review programme have so far affected a number of manufacturing activities, including domestic appliances, electronic equipment, cosmetics and toilet preparations and certain types of machinery. Where decisions have been taken to reduce tariff rates, it has been usual to phase in the reductions over a number of years. A second outcome of the Tariff Review and the resulting Government decisions has been to narrow the disparities between tariff rates applicable to different activities within the same industry, thereby helping to remove a number of impediments arising out of made-to-measure protection.[9] This is likely to contribute to greater intra-industry specialization, lower units costs of production in the long-run and where intermediate products have been affected, aid exporting activities.

Independently of the general Tariff Review, the Government announced in July 1973 a unilateral 25 per cent cut in all tariff rates. This tariff reduction was aimed primarily at alleviating emerging inflationary pressures.

It has been suggested that the 25 per cent tariff cut resulted in a surge of imports into Australia, and that this reduced output and employment in affected industries. Estimates have been made suggesting that 35,000 persons became unemployed as a direct result of the tariff cut. Such estimates have to be regarded with caution. It is true that between May 1973, just before the announcement of the tariff cut, and May 1975, unemployment among manufacturing workers increased by just over 40,000 persons. However, it is difficult to apportion this unemployment increase between the tariff cut and other factors, such as recession induced reductions in demand, the substitution of labour for capital and exchange rate variations.[10] Moreover, the secondary effects of the tariff cut on employment in other industries cannot be readily established, since there would have been both favourable and unfavourable consequences. Work done by Gregory and Martin[11] estimates that in the two years following the 25 per cent tariff-cut only 7 per cent of the increase in imports could be attributable to that decision. They calculated that the effect of exchange rate appreciations was approximately four times greater than that of tariff cuts. This conclusion is supported by recent work by Marsden and Hollander[12] examining the role of tariff changes, exchange rate movements and other factors in the decline in the international competitiveness of Australian manufacturing industries in the early seventies. They found that for all industries the effect of the exchange rate appreciations completely overwhelmed losses in competitiveness due to tariff reductions.

Since the 1973 across-the-board tariff cut, there have been two other significant developments affecting Australia's long-term trade and tariff policies. Firstly, tariff reductions were made in December 1976 consequent upon the devaluation of the Australian dollar in November of that year. A major aim was to avoid inflationary effects in domestic prices arising from the devaluation. Secondly, the Industries Assistance Commission Act was amended in 1978 to ensure that the Commission provided the Government with information on the employment and other social and economic implications of the assistance level it recommended for any industry. The Commission was also required to advise whether the structure of the industry can be improved and how this may be done.

The combined effect of all the above-mentioned factors has meant that in the past decade considerable progress has been made in lowering the general level of protection. The average nominal rate of protection accorded manufacturing industry fell by 38 per cent from 1968-1969 to 1977-1978, while the average effective rate fell by 28 per cent over the period.[13] Much of this reduction was accounted for by the 25 per cent tariff cut of 1973. The remainder was largely a result of Government decisions regarding specific industries as part of the tariff review.[14] Australian tariff rates are, however, still substantial, and continue to represent the major form of assistance accorded Australian manufacturing industry.

One not so encouraging feature of the trends in industry protection is that since 1974 the dispersion of effective rates of assistance has increased, due largely to the more frequent use of quotas over this period. This increase in dispersion has reduced the benefits to the community brought about by the reduction in the average level of assistance.

There are a number of reasons to suggest that further reductions in the level of protection will be achieved over the coming decade. Firstly, as was noted above, the Government through its White Paper on Manufacturing Industry is committed to seek to achieve a less complicated tariff structure based on gradual progress towards lower and more stable levels than in the past. This commitment is tempered by the provision that any reduction in tariffs be considered in the light of existing economic conditions and the ability of the economy to absorb the economic consequences. This provision will provide a brake on future reductions in tariff levels especially in times characterized by a less than buoyant economy.

Pressures on the Australian tariff arising out of the interest and concern shown by developing countries, particularly those within the Asia/Pacific region, in seeking to develop further their exports to the Australian market have been widely discussed of late. Both the Crawford Study Group and the Harries Committee Report on Australia's Relations with the Third World[15] noted that if Australia is to take advantage of export opportunities in the rapidly developing economies of Asia it may be necessary to lower protection levels for some highly protected industries producing goods of export interest to those economies.

Finally, the Crawford Study Group recommended that the Government give a commitment to a further program of gradually reducing high levels of protection once economic circumstances permit. It also recommended that the Government request the Industries Assistance Commission to investigate the possibilities for such a general approach to lowering protection.

In response to these recommendations the Government noted that the commencement, extent and rate of a further approach to general reductions in long-term protection will depend upon: Firstly, the Government's assessment of the effectiveness of its industry development policy currently in operation; secondly, its assessment of economic circumstances, with particular regard to the question of unemployment; thirdly, the receipt of an appropriate report from the Industries Assistance Commission; and fourthly, sufficient notice having been given to industry. Any reductions flowing from such an approach would be phased in gradually over time in accordance with the capacity of industry and the economy to adjust and to accommodate the economic and social consequences. The Government agreed

with the Study Group's recommendation that a reference should be sent to the Commission. The Commission's completed report on the implementation of a further program of general reductions in protection is now being considered by the Government.

It is possible that some time lag will be involved before the Government will have decided on the desirability and means of managing a general tariff reduction. Allowing for the fact that any general reduction in tariff levels would be phased in over time, it would appear that commencement is unlikely to be before the mid 1980s. Such a delay would not be inconsistent with the recommendations of the Crawford Study, which saw the need to delay general tariff reductions until the rate of unemployment fell.

The other major source of tariff reductions over this period is likely to be from industry specific decisions, as both the tariff review comes to completion and through the normal process of Industry Assistance Commission inquiries.

5.2.3 Industry specific policies

Although the Government is committed to general reductions in the level of tariffs it has also recognized that specific policies may be needed to meet the special problems of certain industry sectors. The White Paper noted that:

> the number of sectors which may need to be covered by such policies is likely to be few rather than many, but the few will be significant in terms of employment and related social considerations. The size of the industry sectors concerned and their inter-relationship with the rest of the economy will be important considerations in relation to indentifying the possible need for special policies.[16/]

The White Paper envisaged that any industry-specific policy would be intended 'to facilitate changes in the industries concerned, to make them more competitive in the future and to allow them to adjust to new circumstances.'[17/]

The Crawford Committee's Report also embraced the need for such an approach by pointing out that a few industries with difficult problems may justify industry-specific measures in order to improve their ability to adjust to changed circumstances. It advocated a two-pronged approach to industry specific policies: firstly, these industries would be exempt from any general program of tariff reduction; secondly, such industries could be subject to rationalization and restructuring assistance in order to allow them to cope with lower long-term levels of protection. The Government has recently reaffirmed the need for such an approach to industry specific policies.

The industry specific policies currently in operation, have been introduced with the aim of either granting recipients temporary respite against further penetration of their market share by imports or to enable industries to maintain their existing output and employment levels, through the application of higher levels of protection. The measures provided include tariffs, tariff quotas, local content plans and market sharing arrangements. All industries receiving industry specific support are expected to make concerted efforts to improve their structure and competitiveness over the duration of such policies.

Industry specific policies are subject to regular review by the Industries Assistance Commission. Over the last few years major inquiries have been completed or are nearing completion, on the textiles, clothing and footwear, passenger motor vehicles and domestic appliance industries. These industries currently account for about 13 per cent of manufacturing employment. These industries were identified, in both the White Paper and the Crawford Committee's Report as displaying the possible need for future industry specific policies. Details of current industry specific policies as they relate to these industries are provided below.

Textiles, clothing and footwear: Import quotas are currently in operation with a view to maintaining production and employment levels in industries at mid-1977 levels. It was shown in section 1.2 that the textiles, clothing and footwear industries experienced a fall in employment between 1973-1974 and 1977-1978. The employment decline in these industries was, in part, attributable to the rise in import penetration. Temporary import restrictions have, at least for the time being, offset the trend towards lower levels of long-term assistance in these industries. For example, the average effective rates of protection accorded to the textiles, clothing and footwear industries were substantially higher in 1977-1978 than in 1968-1969. In almost all other industries the average effective rate was significantly lower in the latter years.[18/]

The Government has recently decided on a long term strategy for these industries to commence in 1982. A system of bounties and tariffs is to be applied to most textile products. In regard to the clothing and footwear industries, import quotas are to be retained, as the Government felt that any reductions in the level, or changes in the form of assistance currently accorded these industries, may have unacceptable implications for employment.

Motor vehicles: At time of writing policy centres on the 85 per cent company average local content plan and market sharing arrangements, which ensure that local producers supply approximately 80 per cent of the Australian market. This policy is to operate until the end of 1984. One instrument by which this is achieved is the imposition of quotas. An export credit scheme is scheduled for introduction into the local content plan in 1982. This will allow for duty free imports of automotive products in exchange for exports of these products with an initial limit of the equivalent of 5 percentage points of local content, increasing to 7 1/2 points in 1984.

Whitegoods: In 1978 the Government announced an industry-specific policy which increased the industry's nominal rate of protection to 45 per cent on most of its products. At the same time it was announced that tariffs would be gradually adjusted to lower long term rates, which for most products, was set at 30 per cent.

Tariffs will be reduced by 5 percentage points every two years until that level is reached. The industry is expected to use this phasing period to take action to improve its competitiveness so as to enable it to operate at the low protection levels. Progress in this direction is to be monitored after three years.

5.2.4 Other assistance measures

The Government influences import penetration through a variety of measures other than those already mentioned. These measures are aimed, at least in part, at increasing the competitiveness of domestic industries against import competition. However, relative to tariff assistance, they have only a small impact on import penetration.

The Government provides a number of measures designed to facilitate structural adjustment by enhancing technological change and improving productivity and efficiency in industry. In these areas, market distortions may be such as not to adequately stimulate private investment without additional incentives over and above those provided through the market.

The major direct instrument designed to facilitate additional private industrial research and development is the Industrial Research and Development Grants (IR&DG) Scheme. Between 1975-1976 and 1977-1978 the real value of government expenditure on incentives to IR&D declined by almost 40 per cent, refelcting a decline in private IR&D expenditure and cut-backs in government rates of support. However, with the introduction of the IR&DG scheme attempts are being made by the Government to redress this situation. In 1979-1980 actual outlays under the scheme amounted to $35 million, and in 1980-1981 outlays are estimated to increase by a further 55 per cent to $54 million. The Study Group on Structural Adjustment has suggested that consideration be given to further incentives to IR&D including changes to the IR&DG scheme. The Study Group also proposed the establishment of an Australian Innovation Authority designed, among other things, to assist firms in the commercial exploitation of worthwhile innovations. Government decisions on these matters have yet to be announced.

The Government also provides assistance to innovation and efficiency through a variety of other measures. Current outlays under the Productivity Improvement Program and the Productivity Action Program amount to $1.4 million and a yearly grant is made available to the Industrial Design Council of Australia. The Government has also recently streamlined the administration of the Patents Act by the introduction of petty patents legislation, accession to the Patents Co-operation Treaty and the computerization of patents records.

Mention should also made of the Commonwealth Scientific and Industrial Research Organisation. This organization has a considerable record of achievement, particularly in agricultural and rural research. However, increasing emphasis is now being placed on research relevant to the needs of Australian manufacturing industry including the formation of a separate division of manufacturing industry. In 1978-1979 it is estimated that $A 30 million was allocated to this aspect of its activities.

The provision of export incentives on manufactured exports provide a less direct example of how Government policy may affect the level of import penetration. It can be argued that the provision of export incentives will encourage firms to adopt a more outward looking approach and by assisting firms to expand their market and hence output, productivity may be improved as a result of increases in the scale of production and the degree of specialization. At the same time, increases in manufactured exports are likely to lead to an increase in importing activity. Details of the export incentive schemes currently in operation in Australia were given in Chapter 4 of this report.

Finally, mention should be made of government policies on structural adjustment, retraining and redeployment. Such programs aim to aid the process of adjustment by individuals and firms to rising imports.

In 1974 the Government introduced the Structural Adjustment Assistance (SAA) program, including the Special Assistance to Non-Metropolitan Areas (SANMA) program. It provided ex post compensation to individuals and firms adversely affected by Government decisions to lower protection. This program was intended primarily to assist those adversely affected by the 25 per cent tariff cut of July 1973.

In the latter part of the 1970s the main emphasis of structural adjustment assistance has been on general assistance to individuals to enable them to improve their skills, retrain for alternative employment or relocate in an area where suitable jobs are available. The principal current scheme is the National Employment and Training Scheme (NEAT) which provides eligible persons with training in skills in demand in the labour market. Expenditure under this scheme was $58 million in 1979-1980. The Budget allocation for 1980-1981 has been increased to $68 million.

The NEAT Scheme appropriation also covers some special training programs for young persons. This demographic group has experienced particularly large increases in unemployment since 1974. These special programs include the Special Youth Employment Training Program and the Education Program for Unemployed Youth.

Relocation Assistance is payable to individuals moving to a new location to commence new employment or training under the NEAT Scheme. However, the amounts paid so far for this type of assistance have been quite small. In addition to these schemes the Government also provides assistance for the development of training in the private sector through the Training in Industry and Commerce program. In 1980-1981 $3.0 million has been allocated for these purposes, which is a 25 per cent increase on the previous year's expenditure.

5.3 Changes in comparative advantage

In Chapter 4 it was shown that a number of recent empirical studies indicate that Australia's long term comparative advantage is typically in industries using the factors capital, skilled labour and natural resources in relatively large amounts. These studies also indicate that those industries most vulnerable to import competition are typically labour intensive, especially those using large amounts of unskilled labour.

It would appear that the major effect that changes in comparative advantage are likely to have on the structure of Australian imports over the period to 1990 is an intensifying of existing pressures rather than a fundamental shift in the composition of imports. Imports will continue to be heavily concentrated in the manufacturing sector and particularly in those industries which are typically labour intensive, employ a relatively unskilled workforce and are not involved in the processing of Australian rural and mining products. Over the next decade, those Australian manufacturing industries making extensive use of these factors are likely to find their competitive position against imports, especially from the developing Asian economies, weakened.

As mentioned in Chapter 3, over the next decade, developing Asian countries might be expected to become highly competitive suppliers of an increasingly diverse range of products as they extend their industrial base further into export oriented fields. This will act to put additional pressure on Australian manufacturing. In the ASEAN bloc, Singapore has diversified into the manufacture and export of high technology goods such as scientific equipment, electrical appliances, electronic equipment, industrial machinery and leather, rubber and plastic products. The Philippines and Thailand have shifted towards the development of export oriented light industrial products.

In the East Asian region the comparative advantage of the Republic of Korean, Island of Taiwan and Hong Kong economies is changing. The rapid growth experienced by these countries over the last fifteen years or so, coupled with both rising per capita incomes and real wages has led to a greater emphasis on a diversification of markets, and more complex industrial goods using higher proportions of skilled labour, technology and capital.

Asian countries then, will be increasingly able to offer a greater variety of light manufactured goods in competition with Australian industries. In addition, many other industries including the engineering, metal working and furniture manufacturing industries are likely to face intense competition from Asia.

5.4 Growth in exports

As discussed in Chapter 4, over the next decade there will be considerable growth in Australian exports, especially of mineral and processed mineral products. A recent study by the Department of Trade and Resources[19/] suggests that, even after taking into account the import leakages of the resource devlopment, import increases following increases in national output and repatriation of profits, the growth in exports, in the absence of any policy response is likely to place Australia's balance of payments in strong surplus. Acknowledging the difficulties associated with such an exercise the study estimated the balance of payments surplus in 1989-1990 to be $3,782 million.

In dealing with this surplus a number of policy options are available, all of which will have important implications for the rate of growth of imports over the next decade. The first option, to do nothing, would lead to an accumulation of foreign reserves and hence rapid growth in the money supply. The eventual outcome would be an increase in inflationary pressure within the domestic economy. Under a do nothing option, the resulting

increase in the level of inflation would lead to a loss of competitiveness of Australian industry and lead to a self correction of the balance of payments through a contraction of exports and an expansion of imports. Should the government seek to reduce the inflationary pressures by say a reduction of the budget deficit, the self correction mechanism would be impeded and foreign reserves would continue to build up leading to long term speculation against the Australian dollar. Whilst some government action could be taken to minimize this speculation such as repayment of Australia's foreign borrowings, but such action is limited and only puts off the need for adjustment.

It has been estimated by the Department of Trade and Resources (based on their estimate of the balance of payments surplus of $3,782 million, and assuming that all the adjustment is borne by the revaluation), that the increase in the rate of growth of exports will result in an exchange rate approximately 10 per cent higher than that which would have occurred in the absence of this growth of exports. This revaluation would be gradual and considerably less than that faced in recent times by other advanced industrial economies such as the Netherlands, Norway and Germany. Under this policy, a considerable increase in the growth of imports would be experienced relative to the growth witnessed over the 1970s.

A further possible option is that net capital inflow could be reduced by either slowing the pace of development, direct capital controls, greater Australian investment overseas or generally improving the efficiency of the domestic capital market.

Reducing the pace of development could be achieved by a variety of measures such as slowing the rate of infrastructure expenditure or applying more stringently Australia's foreign investment guidelines. It should be noted however that a partial slowdown in development would still lead to a surplus and complementary policies to tackle this reduced surplus would still be required.

Improving the efficiency of the existing capital market may enable more domestic funds to be allocated to resource development and hence reduce the need for capital inflow. The operation of the domestic capital market is currently being examined by the Campbell Committee, and consideration of the possible options in this area must await the Committee's report.

Alternatively net capital inflow could also be reduced by increased Australian investment abroad. As Australian investment abroad is determined largely by returns available overseas relative to those available domestically it is difficult to see why there should be any large increase in this investment over the next decade. Any action to encourage such investment would introduce distortions in the capital market resulting in possible inefficiency in capital usage. These considerations in addition to the fact that these options would need to be accompanied by a rise in the already high domestic savings ratio,[20/] suggest that the policy response in this area is also unlikely to totally offset the expected balance of payments surplus.

Finally the demand for imports could be strengthened at the prevailing exchange rate by stimulating domestic demand or reducing protection to import competing industries. The strong balance of payments position removes one constraint on the ability of future governments to stimulate the domestic economy and as a consequence, increase imports. As the resource-based development is likely to introduce other constraints into the economy such as shortages of skilled labour and bottlenecks in the supply of capital goods, such action to stimulate the economy could have serious inflationary consequences. Reducing protection to import competing industries would result in increased imports to offset the surplus, however the tariff cuts necessary to totally offset this surplus would need to be large. In the light of the tensions which accompanied the 25 per cent tariff cut and other reductions in protection in the 1970s, it seems unlikely that tariff cuts bearing the brunt of the adjustment will prove to be an acceptable option. Continued gradual reductions in tariffs however may be a more acceptable partial offset to the balance of payments surplus.

Overall then, it can be seen that while a number of policy options are available to offset the balance of payments surplus, most of these options could not be expected to totally offset the surplus. The most likely result is that a combination of a number of the above-mentioned options will be applied, with a large proportion of the adjustment being borne by appreciation of the real exchange rate. Under this scenario then it follows that an increase in the rate of growth of imports over the next decade, can be expected.

5.5 Identification of industries likely to be subject to increasing import pressures

This Chapter has examined import penetration as a major influence on the future industrial structure in Australia. Unfortunately, due to the complexity of the issues and the considerable uncertainty which pervades the many factors influencing the course of import penetration over the next decade, it is not possible to give detailed projections on import penetration of each individual industry in 1990-1991. It is possible, however, to identify those broad industry groups likely to be subject to the most intensive pressures as a result of import penetration. This is achieved by using three different criteria which are explained below.

Firstly, it is possible on the basis of the discussion in Section 5.3, to identify broadly those areas that may be subject to increasing import pressures as a result of industrial development in Asia. These broad industry groups include:

Textiles
Clothing and footwear
Wood, wood products and furniture
Chemicals
Petroleum and coal products
Processed food, beverages and tobacco
Photographic and scientific equipment
Electrical appliances
Electronic equipment
Industrial machinery and equipment
Leather, rubber and plastic products
Engineering and metal working products.

The level of aggregation used means, of course, that import pressures from developing Asian countries will not necessarily be severe for all the narrow industry groups making up these broad categories.

It is worth recalling that in 1977-1978 developing Asian economies did not account for more than 25 per cent of overall import penetration, except in textiles, clothing and footwear, and wood, wood products and furniture. However, they did account for more than 50 per cent of the percentage point increase in import penetration between 1968-1969 and 1977-1978 in (at the two digit ASIC level), textiles, clothing and footwear, wood, wood products and furniture, food, beverages and tobacco, paper, paper products and printing, basic metal products and manufacturing n.e.c.[21/]

A further method of identifying vulnerable or potentially vulnerable industries is to determine those industries that have been subject to significant and increasing import penetration over recent years.[22/] Table 4.2 suggests the following industries:

Man-made fibres, yarns and fabrics
Knitting mills
Clothing
Footwear
Plywood, veneers and manufactured boards
Newspaper and books
Clay products
Cutlery and hand tools, metal coating and finishing and metal products n.e.c.
Motor vehicles and parts and transport and transport equipment n.e.c.
Television sets, radios, communication and electronic equipment n.e.c.
Household appliances n.e.c.
Electrical machinery and equipment n.e.c.
Agriultural machinery and equipment
Construction, earthmoving and materials handling machinery and equipment
Leather tanning, leather and leather substitute products n.e.c.
Rubber products
Ophthalmic articles, jewellery, silverware and other manufacturing.

It should be noted that this list includes those industries referred to in section 5.2 as in receipt of specific industry assistance, namely clothing, textiles and footwear, motor vehicles, and whitegoods, and that some overlap occurs with those broad industry groupings identified as potentially vulnerable from the discussion of changes in comparative advantage.

In regard to the service industries, import shares throughout most of the sector have traditionally been low and it is unlikely this situation will change much over the next decade. The only service industries to experience large import shares have been the water and air transport industries (see section 5.1). There may be some increase in the import share of these two industries over the coming decade as world trade continues to expand and overseas competition increases. Most of the service industries enjoy natural protection due to the nature of the services provided. Other industries such as banking and financing are protected from import competition through government regulation. Unless changes are made to these policies it is unlikely that import shares in these industries would significantly increase.

Another indication of the industries most likely to face increased import competition over the next decade is obtained by identifying those industries currently the recipients of high levels of protection. These industries generally suffer a high cost disadvantage against imports, relative to other domestic industries, and would be most susceptible to any movement towards a more liberal trading environment.

By defining highly protected industries as those with an effective rate of protection of 50 per cent or more,[23/] or those which have had recourse to quantitative restrictions or special arrangements in recent years,[24/] the following list of highly protected industries, at the 4 digit ASIC level, is obtained:

Confectionary and cocoa products
Beer
Wine and brandy
Man-made fibres and yarns
Man-made fibre broadwoven fabrics
Cotton yarns and broadwoven fabrics
Textile finishing
Household textiles
Hosiery
Cardigans and pullovers
Knitted goods, n.e.c.
Women's and girl's blouses and frocks
Women's and girl's outerwear, n.e.c.
Men's and boy's trousers and shorts; work clothes
Men's and boy's suits and coats; waterproof clothes
Underwear, nightwear, shirts and infant's clothing n.e.c.
Foundation garments
Clothing n.e.c.
Rubber footwear
Footwear, n.e.c.
Inks
Metal containers
Motor vehicles
Motor vehicle instruments and parts
Manufacturing, n.e.c.

It should be emphasized that the industries contained in this list are not directly reconcilable with those given earlier in this section from Table 5.2, which uses the input-output industry classification.

Although the level of effective protection provides an indication of those industries likely to face increased competition over the next decade, care must be exercised in applying this information. For a number of the industries listed above, imports have traditionally only supplied a small proportion of domestic sales. Moreover, because of the possibility that part of the existing protection is not being used, it is difficult to ascertain whether a reduction in protection would lead to any significant increase in imports. The industries for which this reservation is relevant, include soft drinks, cordials and syrups, solid fibre board containers, inks and metal containers.

This section has attempted to indicate which industries are likely to be subject to increasing import competition, it must be re-emphasized that the actual outcome over the next decade will depend partly on government and industry attitudes to protection on all goods and services, and how effective existing industry policies are in creating more competitive domestic industries. These attitudes to protection will have an important role in determining the rate of economic growth in Australia over the next decade. Continued use of high levels of protection for industries facing intense competition will tend to keep the exchange rate higher or the inflation rate higher than it would otherwise be and so transfer the burden of adjustment to other sectors of the economy and result in lower overall economic growth than if protection levels were to be reduced.

Footnotes

1. This data excludes imports to the service sector.

2. These figures are based on IMPACT documentation and as such include the invisibles of the Balance of Payments Current Account.

3. Known also as the Vernon Report, after the Chairman, Sir James Vernon.

4. Known also as the Jackson Committee, after the Chairman, Mr. Gordon Jackson.

5. Known also as the Crawford Study Group, after the Chairman, Sir John Crawford.

6. White Paper on Manufacturing Industry (1977), p.61.

7. The IAC has continued the Tariff Review since its establishment.

8. In August 1977 the Government decided to defer sending to the IAC the remaining references necessary to complete the Tariff Review. The decision was taken in the light of the economic conditions at the time. However, in June 1979 the Government accepted a recommendation of the Study Group on Structural Adjustment (the Crawford Group), and sent forward those remaining references for inquiry by the Commission. The timetable laid down indicates that the Tariff Review will be completed by the end of 1981.

9. Made-to-measure protection refers to product by product tariff rate differences according to the relationship between cost of production in Australia and overseas.

10. Gruen (1975) argues that less than 10 per cent of unemployment at that time could be attributable to government tariff decisions. The effect of revaluations and wage increases on profitability in 'tariff-affected' industries were found to be far more potent influences.

11. Gregory and Martin (1976), 'An Analysis of Relationships Between Import Flows to Australia and Exchange Rate and Tariff Changes', Economic Record, No. 137, March 1976.

12. Marsden and Hollander (1980).

13. In 1968-1969 the average nominal rate of assistance to manufacturing industry was 24 per cent and the average effective rate 36 per cent. By 1977-1978 these rates had fallen to 15 per cent and 26 per cent respectively. It should be noted that these figures on rates of assistance include import quotas and subsidies as well as tariffs.

14. Industries Assistance Commission, Annual Report 1978-1979, AGPS, Canberra, 1979, p.79.

15. Report of the Committee on Australia's Relations with the Third World, (1979).

16. White Paper, op.cit., p.25.

17. Ibid.

18. Industries Assistance Commission, op.cit., Appendix 1.3.

19. Department of Trade and Resources (1980b).

20. In deriving the estimates of the balance of payments surplus, the study assumed that the resource-based development will induce increased Australian savings for investment in this development.

21. Johns and Metcalfe (1980).

22. As it was not possible to estimate the extent to which import penetration may reflect, in part, imports of products not manufactured by Australian firms, this section tends to over estimate the vulnerablility of certain industries.

23. Compiled from Industries Assistance Commission (1980), Table 3.1.1.

24. Attention is focused on those arrangements mentioned in the Study Group on Structural Adjustment (1979). Other arrangements such as regulatory devices which protect some of the service sector industries from import competition are less likely to be subject to major change over the next decade, and so have been excluded.

Table 5.1: Australian domestic market for mining and manufactures: shares held by imports, 1968-1969 to 1977-1978 (a)

	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78
Metallic minerals	0.3	0.3	0.3	0.2	0.1	0.6	0.3	0.2	0.1	n.a.
Coal and crude petroleum	50.9	35.2	14.5	11.5	8	17.1	21.2	16.6	17.3	n.a.
Non-metallic minerals	1.1	33.5	24.8	20.1	21.9	22.8	34.4	22.4	21.8	n.a.
Services to mining	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
Food and tobacco	4.8	5.1	n.a.	5.0	4.9	6.1	6.9	6.2	5.1	7.7
Textiles	32.7	34.2	n.a.	34.9	34.2	40.2	36.7	37.2	40.7	40.3
Clothing and footwear	7.3	8.5	n.a.	12.5	12.7	17.0	22.3	20.5	22.7	22.8
Wood, wood products and furniture	8.1	8.2	n.a.	8.0	8.4	10.7	9.5	9.7	11.7	10.9
Paper and paper products, printing	17.0	17.1	n.a.	15.9	15.4	16.3	18.7	14.8	18.1	17.0
Chemicals, petroleum and coal products	24.7	26.3	n.a.	25.9	24.1	28.3	34.8	31.3	33.3	33.2
Non-metallic mineral products	9.0	9.8	n.a.	9.1	8.5	9.2	9.7	9.1	10.5	10.4
Iron and steel	8.6	8.2	n.a.	9.5	7.9	11.1	11.7	7.6	9.1	9.1
Non-ferrous metal basic products	5.0	4.4	n.a.	4.3	3.7	4.6	4.7	2.7	5.2	5.6
Other metals, metal products	8.6	9.0	n.a.	8.2	7.9	8.3	10.3	9.3	11.3	11.3
Transport equipment	28.4	28.1	n.a.	23.1	22.8	29.2	30.6	28.3	32.5	30.3
Machinery and household appliances	32.7	34.9	n.a.	34.5	32.9	34.5	42.0	41.4	46.7	45.4
Miscellaneous manufacturing	20.7	21.2	n.a.	21.4	20.6	22.9	26.2	25.4	29.1	27.0
Total manufacturing	17.5	18.2	n.a.	17.5	16.6	19.4	22.3	20.9	25.1	22.9

Source: Data supplied by Industries Assistance Commission.
Note: (a) Imports as a percentage of domestic sales, except for the metallic minerals, coal and crude petroleum, non metallic minerals and services to mining industries, which were calculated using domestic turnover.
n.a. = not available.

Table 5.2: Australian domestic market for mining and manufacturers: shares held by imports, 1968-1969 to 1976-1977: disaggregated industry categories (a)

Industry category	1968 -69	1969 -70	1970 -71	1971 -72	1972 -73	1973 -74	1974 -75	1975 -76	1976 -77
Iron	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Other metallic minerals	0.1	0.4	0.4	0.2	0.1	0.8	0.4	0.1	0.1
Coal and crude petroleum	50.9	35.2	14.5	11.5	8.4	17.1	21.2	16.6	17.3
Non-metallic nec	41.1	33.5	24.8	20.1	21.9	22.3	34.4	22.4	21.3
Services to mining	0	0	0 (b)	0	0	0	0	0	0
Meat products	1.7	1.8	na	1.4	1.7	1.3	1.2	0.8	1.1
Milk products	0.9	1.1	na	1.2	1.3	1.3	1.4	1.7	1.9
Fruit and vegetable products	7.0	7.6	na	7.3	5.3	10.4	15.1	8.3	9.4
Margarine, oils and fats	21.6	22.4	na	17.1	12.4	17.5	18.9	15.3	17.9
Flour mill and cereal food products	0.8	0.8	na	0.9	0.8	1.0	1.0	0.3	0.9
Bread, cakes and biscuits	1.2	1.1	na	1.2	1.2	1.1	1.1	1.2	1.3
Confectionary and cocoa products	6.6	7.5	na	6.0	5.5	6.1	11.2	7.3	8.9
Food products nec	7.2	7.7	na	6.8	8.5	10.4	9.4	3.9	14.0
Soft drinks, cordials and syrups	0.2	0.3	na	0.3	0.2	0.3	0.4	0.3	0.3
Beef and malt	0.2	0.2	na	0.2	0.2	0.3	0.2	0.2	0.2
Alcoholic beverages nec	36.7	34.9	na	34.4	35.4	36.3	39.1	33.3	40.2
Tobacco products	9.7	9.2	na	10.1	9.5	12.3	12.9	14.8	14.8
Prepared fibres (c)	na	na	na	na	na	na	na	na	na
Man made fibres, yarns and fabrics	36.5	38.7	na	41.6	42.3	49.9	45.7	40.5	50.9
Cotton, silk + flax yarns, fabrics and household textiles	48.3	49.0	na	47.8	51.4	55.5	50.4	49.8	50.9
Wool and worted yarr and fabrics	8.9	9.5	na	9.1	8.0	9.9	10.8	13.9	14.3
Textile finishing	0	0	na	0	0	0	0	0	0
Textile floor covering, felt + felt products	29.3	28.9	na	22.0	17.1	9.6	22.9	21.9	25.3
Textile products nec	24.0	24.8	na	22.0	22.3	24.2	24.0	21.4	25.6
Knitting mills	8.5	8.6	na	14.7	13.6	17.1	21.7	20.8	22.2
Clothing	6.3	7.2	na	10.0	11.7	15.9	22.5	19.7	21.3
Footwear	8.6	11.5	na	16.1	14.4	20.2	22.8	22.3	27.0
Sawmill products	13.3	14.4	na	14.1	13.4	13.6	14.4	14.3	17.2
Plywood, veeners and manufactured boards	10.2	10.6	na	10.3	9.9	13.0	13.2	15.4	15.1
Joinery and wood products nec	4.1	4.3	na	4.0	4.2	4.9	5.8	5.1	6.1
Furniture, mattresses, brooms and brushes	2.9	3.0	na	3.0	3.3	4.9	5.8	6.4	9.0
Pulp, paper and paperboard	35.6	36.2	na	32.6	33.4	34.3	40.4	29.9	38.5
Fibreboard and paper containers	7.1	7.0	na	4.6	4.4	4.4	4.5	3.4	4.0
Paper products nec	7.2	6.5	na	5.6	3.9	7.2	3.7	6.0	7.3
Newspaper and boods	25.1	25.8	na	28.2	25.5	27.0	31.6	28.1	30.5
Commercial + job printing + printing trade services	3.2	3.4	na	3.5	3.3	3.8	3.3	3.5	3.6
Chemical fertilizers	8.0	5.4	na	4.6	3.6	1.1	5.0	3.2	5.8
Industrial chemicals nec	36.5	35.5	na	35.3	34.8	37.1	40.8	34.0	38.1
Paints, varnishes and lacquers	3.2	3.4	na	3.7	3.5	3.7	4.8	4.0	5.8
Pharmaceutical + veterinary products agricultural chemicals	20.7	23.8	na	21.2	19.9	19.7	22.9	19.2	17.7
Soap and other detergents	4.8	4.9	na	4.6	4.6	4.8	5.5	4.6	5.3
Cosmetic and toilet preparations	6.5	6.7	na	6.7	6.0	5.7	6.9	6.3	7.1
Chemical products nec	23.6	33.6	na	33.9	28.4	30.2	35.3	43.5	34.2
Petroleum and coal products	32.2	47.5	na	44.9	47.3	71.1	98.2	91.9	89.4
Glass and glass products	24.0	26.8	na	24.7	24.7	25.4	25.4	22.5	24.8
Clay products	15.0	16.7	na	14.9	15.7	17.0	18.4	19.0	21.0
Cement	0.6	0.6	na	0.7	0.4	1.2	1.5	1.9	2.2
Ready-mixed concrete	0	0	na	0	0	0	0	0	0

Table 5.2: continued from page 129.

Industry category	1968 -69	1969 -70	1970 -71	1971 -72	1972 -73	1973 -74	1974 -75	1975 -76	1976 -77
Concrete products	0.1	0.1	na	0.1	0.1	0.0	0.2	0.1	0.1
Gypsum, plaster and other non-metallic mineral products	10.1	10.2	na	10.2	8.8	9.0	12.2	9.6	12.2
Basic iron and steel	8.6	8.2	na	9.5	7.9	11.1	11.7	7.6	9.1
Non-ferrous metal basic products	5.0	4.4	na	4.3	3.7	4.6	4.7	2.7	4.8
Metal containers, sheet metal products	2.4	2.3	na	2.2	2.3	2.5	3.3	3.4	4.3
Cutlery and hand tolls, metal coating and finishing and metal products nec	18.0	18.6	na	17.7	16.9	18.1	22.2	20.5	26.4
Motor vehicles and parts and transport equipment nec	21.8	22.9	na	22.1	27.2	24.8	29.5	28.2	30.5
Ship and boat building and repair	48.4	45.9	na	5.4	26.3	24.3	33.6	10.2	11.4
Aircraft building and repair	79.7	84.6	na	78.1	39.7	86.9	65.5	70.3	
Photographic, scientific equipment etc.	73.3	74.7	na	70.3	69.3	71.5	75.3	73.7	76.6
Television sets, radios, communication and electronic equipment	36.2	41.0	na	35.3	36.3	41.8	51.4	52.4	57.5
Household appliances nec	10.7	11.6	na	12.8	14.9	19.6	27.0	22.6	26.5
Electrical machinery and equipment nec	18.5	19.6	na	19.8	19.2	18.4	24.3	22.6	24.3
Agricultural machinery and equipment	33.9	41.3	na	35.3	39.2	32.6	42.1	40.4	44.0
Construction, earthmoving and materials handling machinery and equipment	32.2	33.3	na	41.2	29.9	40.7	49.9	53.0	59.7
Other machinery and equipment	44.9	47.4	na	46.3	42.3	41.7	46.5	68.6	43.9
Leather tanning, leather and leather substitute products nec	15.2	16.8	na	16.4	17.4	21.2	25.6	29.8	31.2
Rubber products	18.1	18.0	na	21.2	21.2	23.7	29.6	25.6	28.4
Plastic and related products	20.7	20.3	na	18.7	16.9	18.5	20.1	18.9	21.9
Signs, advertising displays, writing and marking equipment	16.5	16.9	na	14.4	16.8	13.6	18.4	18.1	19.7
Opthalmic articles, jewellery, silverware and other manufacturing	26.4	32.2	na	42.8	44.7	39.0	50.2	51.8	58.6
Fabricated structural metal products	2.1	2.0	na	1.5	1.1	1.2	1.3	1.0	1.5
Locomotives, rolling stock and repair	7.3	9.8	na	10.5	6.3	5.3	7.1	6.3	5.6

SOURCES: IAC data on imports and exports; ABS publications - "Mining Establishments, Details of operations" ref. No. 84C2.0 "Manufacturing Establishments, Details of Operations" ref. No. 8203.0.

Notes:
(a) The import shares for mining activities were calculated using turnover, but for manufacturing domestic sales were used.
(b) Import shares for the manufacturing sector are not available for 1970-71 since a census of manufacturing establishments was not undertaken for the year. There are therefore no statistics on domestic sales for 1970-71.
(c) Figures for this industry not provided due to difficulties with the data.

CHAPTER 6. A POSSIBLE FUTURE INDUSTRIAL STRUCTURE

6.1 Introduction

The preceding chapters have concentrated on sketching likely developments in certain variables that are expected to have a strong impact on the Australian industrial structure through to the year 1990. Although this information is useful in itself, it was largely presented without any heed being paid to the interactive nature of economic activity. This shortcoming is met, in this chapter, by examining the interactions of the variables within a general equilibrium context. To this end, use was made of SNAPSHOT,[1/] a general equilibrium model of the Australian economy, designed specifically for making long run projections of the industrial structure ten or more years into the future. SNAPSHOT incorporates an economic accounting framework interconnecting the multifarious aspects which it models. This guarantees that all projections made are mutually consistent. The model's mode of operation does not trace the path of the economy from the base year to some future target year, but rather simply presents a snapshot picture for a selected year, in this case 1990. For this reason no attempt is made to trace the dynamic development of Australia's industrial structure over the current decade.

Before proceeding to the results obtained via SNAPSHOT, it is necessary to emphasize that there are many difficulties associated with such an exercise, not the least of which are the inherent limitations associated with any general equilibrium analysis of an open economy. In Australia's case these limitations are possibly greater because of the absence of any formal or indicative planning in the economy. The results presented in this Chapter outline only one possible outcome for the Australian economy. This outcome is dependent on a number of specific assumptions. Variations in the underlying assumptions including any inaccuracies in the forecast values of the exogenous variables could significantly alter the results. As such, the results should be considered to be only illustrative of the types of structural changes that are likely to take place, rather than a precise estimate of the actual structure of Australian industry in 1990. Tests of the sensitivity of the results to changes in certain key exogenous variables are included in Appendix 2.

The initial approach adopted here is to run SNAPSHOT, using our preferred estimates of the exogenous variables. The results obtained are then presented as an indication of the structure of Australian industry in 1990.

6.2 Possible future industrial structure

In this section the results generated from SNAPSHOT, using what are regarded as our best estimates of the variables exogenous to the model, are presented. These results provide an indication of some aspects of the Australian industrial structure in the year 1990-1991.

Before presenting the results generated from SNAPSHOT, it is necessary to describe the assumptions made regarding the base scenario. This base scenario is largely made up of three economic scenarios - the technological, demographic and international trade scenarios. These are discussed separately below.

6.2.1 Technology scenario[2]

For each of the 109 industries used in this report the technology shows the number of workers and the amount of capital and other inputs from the other industries required to produce a unit of industry output. The technology component of SNAPSHOT comprises forecasts for 1990-1991 of three matrices of input-output technology coefficients, for the 109 input-output industries. These three matrices comprise (a) a 109 x 109 matrix of direct input coefficients,[3] (b) a 109 x 109 matrix of capital coefficients[4] and (c) a 9 x 109 matrix of labour coefficients.[5] The latter matrix allows for the nine occupational categories in the workforce which are distinguished in SNAPSHOT. The matrices for 1990-1991 were generally derived by updating the known 1971-1972 coefficients.

Where time series of comparable input-output data are available, it has generally been found that the principal changes in factor requirements per unit of industry output take place in the labour matrix.[6] This was also the experience in updating the input-output coefficients of the SNAPSHOT model. One feature of the 1990-1991 technology forecasts is that the direct requirements coefficients are expected to undergo only slight changes from those of 1971-1972, even in industries in which substantial changes of a technical nature are expected to occur. This is in marked contrast to the coefficients of the labour matrix, which are expected to undergo quite substantial changes. Changes are also expected in the coefficients of the capital matrix, though typically these changes are less than a few per cent. In general, technological change in production processes leads to continually diminishing labour to output ratios that is, improvements in labour productivity. This feature of the technology matrix suggests therefore, that technological change can be fairly well represented in an economic framework by appropriate changes in labour productivity.

Derivation of changes in the three technology matrices for use in the base scenario was a complicated exercise, and is only briefly explained here.[7] Fundamentally, the procedure involved initially selecting those industries that were expected to provide a large fraction of Australian industry output in 1990 and those industries in which significant changes in their input structure were likely during the period 1971-1972 to 1990. For these industries, experts within both industry and government were asked to provide estimates of likely changes in factor requirements per unit of output, industry structure, output growth, technical advances, etc., up to 1990. These estimates were then revised in the light of additional information originating from other industry studies, estimated coefficients from overseas countries and more recent statistics. For the remaining industries, changes to the coefficients were obtained by extrapolation of past trends or from any available additional information. It is worth noting that the industries subject to detailed appraisal accounted in 1971-1972 for about 56 per cent of GDP and about 49 per cent of total employment.

6.2.2 Demographic scenario

The analysis distinguishes nine household (or consumer) groups based on the following socio-demographic information: the number of adults, age of household head, and number of children. The parameters characterizing the consumption behaviour of these nine consumer groups are based on the work of Williams (1972) as discussed briefly in section 2.1. In section 2.1 estimates of the number of households in each group in 1990-1991 were given under different assumptions regarding net immigration. For the purposes of the base scenario which is also regarded as the most likely scenario, a net immigration rate of 50,000 persons per year was assumed.

The other exogenous demographic input into SNAPSHOT is the level of employment. As discussed in section 2.2, estimates of the workforce require information on workforce participation rates and population size. On the assumption of 50,000 persons per year net immigration, the population in 1990-1991 for the age group 15 years and above, is projected to be 12.64 million. Applying the Borrie (1975) forecasts of the participation rates in 1990-1991 of 63.9 per cent of persons in the workforce aged 15 years and above, gives a potential workforce size of 8.07 million persons. This figure was then adjusted to allow for a 4 per cent unemployment rate in 1990-1991 giving an estimate of the total employed of 7.75 million persons. The assumption of 4 per cent unemployment in 1990-1991 implies a significant improvement on the unemployment level of about 6 per cent which has applied between 1976 and 1979. However, the lower unemployment rate seems achievable, given the likely rapid growth in economic activity, as Australia takes advantage of its strong energy and mineral base over the next ten years.

6.2.3 International trade scenario

General descriptions of likely developments in Australian exports and imports were provided in Chapter 4 and 5 respectively. However, for the purpose of general equilibrium analysis, it was necessary to disaggregate this data into the 109 industry classification used in SNAPSHOT. To this end, data provided by IMPACT on expected export levels and world prices were selected as appropriate for use in the base scenario. The growth rates of world commodity prices were drawn from an IMPACT commissioned study by Freebairn (1978). This study used information gained from time series analysis of past trends of selected commodities, market models and a review of available literature. This data, which is consistent with the description of export possibilities given in Chapter 4, is given in Tables 6.1 and 6.2.

With regard to export and import price elasiticities, the information supplied by IMPACT was modified to take into account the long-run nature of the projections. Where available, empirical studies form the basis of these modifications. In the absence of such studies, the modifications drew on knowledge of the characteristics of the goods in question and in the case of the export elasticities, information regarding the markets in which the exports compete. Data on these parameters is given in Table 6.3.

In the analysis it is necessary to have, for each industry, a view of the likely pattern of import penetration in 1990-1991. The procedure adopted was to assume initially that the value of imports would represent the same proportion of domestic production in 1990-1991 as they did in 1974-1975. The values of these shares in 1974-1975 are given in Table 6.4. From this starting point, across-the-board adjustments are made to the import shares to ensure that the foreign currency value of imports is just sufficient to balance the exogenously specified foreign currency value of exports.

6.2.4 Miscellaneous exogenous variables

In addition to the exogenous inputs already discussed, SNAPSHOT requires a number of further exogenous inputs. These include tax rates, depreciation rates, occupational wage relativities between industries, rates of return for each industry and government expenditure. With the exception of government expenditure, the input values adopted assume that the base period values are maintained in 1990. For government expenditure it was assumed that the growth rates established over 1962-1963 to 1971-1972 were maintained to 1990-1991 with some allowance being made for likely demographic influences.

6.3 The simulation results

Having described the components of the base scenario attention is now turned to the simulation results. Table 6.5 sets out the base scenario macro variables projection.

Consumption and investment comprise the major endogenous components of GDP in SNAPSHOT. Real consumption is projected to increase by 5.8 per cent per annum over the period 1971-1972 to 1990-1991. This compares with 5.0 per cent per annum increase in the period 1962-1963 to 1971-1972. In value terms, consumption is projected to reach $64.7 billion (expressed in 1971-1972 prices) in 1990-1991. In contrast, the rate of growth in real investment is projected to decline from the level of 6.9 per cent per annum achieved over the period 1962-1963 to 1971-1972 to 4.6 per cent per annum over the period 1971-1972 to 1990-1991. This low rate of growth in investment implies that the percentage of GDP accounted for by investment is projected to fall from 25.5 per cent in 1971-1972 to 22.9 per cent in 1990-1991.

Exports are exogenous to the model, and are assumed to grow at a rate of 4.0 per cent per annum over the period 1971-1972 to 1990-1991 compared with an increase of 8.4 per cent per annum between 1962-1963 and 1971-1972. As a result, the value of exports in constant 1971-1972 prices slightly more than doubles from $5.4 billion in 1971-1972 to $11.3 billion in 1990-1991.

Imports over the same period are projected to increase from $5 billion to $13.6 billion. This represents a 5.4 per cent per annum increase over the period 1971-1972 to 1990-1991 compared with a 6.5 per cent per annum increase over the period 1962-1963 to 1971-1972.

The other major exogenous variables, are population, labour force and government purchases of goods and services. Estimates of the population and the employed workforce have already been given as 16.488 and 7.755 million persons respectively. Government purchases are projected to have lower growth rates between 1971-1972 and 1990-1991 than between 1962-1963 and 1971-1972, falling from 5.9 to 4.7 per cent per annum.

GDP by definition is made up of the sum of consumption, gross investment, government purchases and balance of trade and is projected to grow in real terms at an annual average rate of 5.2 per cent. This rate of growth is only slightly below the level of 5.5 per cent per annum achieved over the period 1962-1963 to 1971-1972.

Given the estimates of the population, it can also be seen that GDP per person is projected to grow at an average annual rate of 3.8 per cent. This is higher than the projected growth rate of 2.9 per cent per annum for GDP per worker, reflecting the increased proportion of the population expected to be in the workforce in 1990-1991. Consumption per person and the average real wage per employee are projected to grow at rates of 4.4 and 3.5 per cent per annum respectively over the period 1971-1972 to 1990-1991. This high rate of growth in GDP, consumption and the associated indicators of standard of living is in contrast to the expectations in most other developed countries.

Although Australia is favourably placed to enjoy rapid economic growth over the next decade, due largely to its strong energy and mineral base, it is likely that the projected GDP may be over-estimated to some extent. It is a matter of record that the period 1973-1974 to the present has been characterized by rates of growth in GDP far slower than traditionally experienced. The actual growth rate of GDP for the period 1971-1972 to 1977-1978 was of the order of only 3 per cent per annum. Because of the protracted period of this downturn in economic activity it is likely that an assumption, made in SNAPSHOT, that the periods of lower than average economic growth will be balanced by periods of higher economic growth will not be an accurate representation of economic activity in Australia over the period 1971-1972 to 1990-1991. A more likely outcome is that the period 1971-1972 to 1990-1991 will witness an above average number of years of low economic growth. To gauge the extent of any possible bias introduced by this assumption SNAPSHOT was run using 1977-1978 as its base year.[8/] The results of this run, though necessarily tentative, suggest that the base scenario projections of GDP and consumption are biased upwards by this assumption. It was also found however that the considerable forces for growth expected in the 1980s ensure that the base scenario projections do closely represent economic growth potential over the next decade.

In addition, this test also indicated that the level of investment projected in the base scenario is under-estimated. This under-estimation arises largely from the fact that the large investments in the minerals and energy fields will be concentrated in the 1980s rather than spread evenly over the period 1971-1972 to 1990-1991. Another reason for suspecting that the investment levels projected in the base scenario may be a slight under-estimate is that the increasing cost of investment arising from the recent sharp increases in energy has not been adequately accounted for in the model. It was noted in Chapter 2 that the increasing price of energy

will require considerable investment over the next decade in the search for new energy reserves, the development of more energy efficient production processes and substitutes for oil in these productive processes. Much of the information used in constructing the capital requirements matrix was obtained prior to the realization of the impact the increasing real costs of energy (particularly oil) is likely to have on the cost of investment.

6.4 Labour demand

As mentioned previously in the SNAPSHOT model the total number of people in the workforce in 1990-1991 is specified exogenously. The composition of workforce, however, is endogenous and is determined by the pattern of demand for the products of various industries. The SNAPSHOT solution provides a breakdown of labour demand, which is consistent with the projected industry structure and the exogenously determined workforce and labour coefficients.

It is assumed initially that an unemployment level of 4 per cent will prevail in 1990. It should be noted, however, that various unemployment percentages can be specified exogenously and this assumption regarding unemployment is relaxed in Appendix 2 to gauge its effect on the projected industry structure.

Table 6.6 presents data for 1971-1972 and 1990-1991, on the demand for labour and the percentage contribution to total employment for the nine occupational groups under the base scenario. The general impression conveyed by these projections is that there will be no major changes in the occupational structure of the workforce between 1971-1972 and 1990-1991. Moreover, there is not expected to be an absolute decline in employment for any occupational group, although some occupations will be growing more rapidly than others.

The fastest growing occupations are projected to be the skilled white collar groups and the skilled blue collar (building) group. Both of these ocupational groups are projected to grow at an average annual rate of 3.1 per cent over the period 1971-1972 to 1990-1991. In the case of the skilled blue collar (building) group this rapid growth reflects the relative increases in demand for the building and construction and timber and furniture industries. The reasons for the fast growth in the skilled white collar group lie partly in the relatively fast growth anticipated in the output of retailing and wholesale services and partly in the fact that these industries will need almost as many skilled white collar workers per unit of output as they did in 1971-1972. In addition strong growth for skilled white collar workers is projected for the public administration and community services and recreational and personal services industries.

The professional white collar group is predicted to grow at an above average annual rate of 2.7 per cent, due largely to the anticipated above average increase in demand for public administration and community services.

The remaining groups that are predicted to have above average rates of growth are the skilled blue collar (metal and electrical) and the semi- and unskilled blue collar groups, for which the expected average annual growth rates are 2.5 and 2.4 per cent respectively.

For the skilled blue collar (metal and electrical) group, the employment prospects do not depend heavily upon the prospects of a few major industries as workers in this group are employed in a wide range of industries, with no single industry employing more than 14 per cent of the group. Industries which rank high as employers of this group, (e.g. building and construction, repairs, fabricated metal products, retail trade and other basic metal products) are expected to experience average or above average growth to 1990.

Reduction in the skill content of certain activities within some industries, particularly service industries, is predicted to provide strong growth in demand for the semi- and unskilled blue collar workers in those industries. The group as a whole is predicted to continue to account for the largest proportion of the workforce in 1990-1991. The skilled blue collar (other) group is projected to grow at the average rate for all occupations with the above average growth in output expected in the recreation and personal services industry, which is a large employer of this type of labour, being offset by below average growth in many manufacturing industries.

The occupational groups that are predicted to grow at a significantly lower than average rate are the semi- and unskilled white collar, rural workers and armed services groups. The predicted growth for the semi- and unskilled white collar group is 1.6 per cent per annum. Public administration and community services is the only major industry where demand for such workers will grow rapidly. Very low rates of growth of demand for semi- and unskilled white collar workers by the major employers, wholesale trade, banks, finance and insurance, and property and business services are projected. In fact the banking industry is expected to reduce its employment of workers in this occupational group, so that the number employed in 1990-1991 will be less than in 1971-1972.

The general decline in the importance of the rural sector as an employer of labour which has occurred over the last two decades is expected to continue over the period to 1990-1991. Table 6.6 shows that growth in rural employment is expected to be only 0.9 per cent per annum.

In SNAPSHOT, the size of the armed services is determined exogenously. Under the base scenario, provision was made for an increase in real defense expenditure of 2.7 per cent per annum, which yielded an employment growth in the armed services of 2.0 per cent per annum.

6.5 Industry results

The projected 1990-1991 domestic production levels for a fifty-four industry classification are given in Table 6.7.[9/] In interpreting these results, the emphasis is placed on the broad features of the results, rather than on the results for specific industries. Indeed the difficulties associated with providing these predictions, necessitates that only limited credence be given to the specific results.

It is apparent from Table 6.7 that all industries are expected to achieve a significant positive rate of growth over the period 1971-1972 to 1990-1991, and that the difference between the rates of growth of the industries, is, in most cases, not great. This is illustrated by the rankings of the industries according to their expected rate of growth. This ranking shows that there is only a two percentage point difference in the rate of growth of the industry ranked seventeen (printing products) and the industry ranked forty-nine (crude petroleum).

Taking a broad view it can be seen that the projections contained in Table 6.7 are in line with past trends in sectoral development, with the mining, associated processing and service industries being concentrated among the fastest growing industries and the rural and manufacturing industries being concentrated among the slowest growing industries. This is further evidenced in Table 6.8 which shows the share of value added by sector for 1962-1963, 1971-1972 and 1990-1991.

The importance of Australia's strong minerals and energy base to growth in the Australian economy over the next decade is underlined by the observation that of the eight industries projected to achieve the highest rates of growth, four of these industries (coal, electricity, other basic metal products and services to mining), are directly associated with the exploitation of this base. In addition the non-metallic mineral products, n.e.c. Other metallic minerals and fabricated metal products industries all rank amongst the fastest growing manufacturing industries. Growth in these industries is also closely associated with exploitation of Australia's natural resource base.

Another important determinant of the relative differences in the growth of domestic production is the extent to which the demand for an industry's product is income elastic. The income elastic industries, recreation, personal services, air transport, building and construction, timber and furniture, and beverages all figure predominantly amongst the industries expected to grow relatively fast, while the income inelastic industries, clothing and footwear, fruit, vegetable oils and fats, food products, n.e.c., milk products and the fishing, trapping and hunting industries all figure amongst those industries projected to have the lowest industry growth rates.

One noteable feature of the results presented in Table 6.7 is that those industries projected to achieve the highest rates of growth are spread across both the exporting and import competing sectors. This can be explained by the fact that in this scenario, balance of trade was achieved with only minor changes to the import shares. This implies that, under the base scenario, import competing industries are in general not expected to be severely affected by increased import competition over the next decade, and consequently the degree of import competition does not play a major role in explaining the relative growth differences.

The growth in exports is more useful in explaining some of the differences in the relative growth rates, particularly in those industries where exports are projected to account for a high proportion of domestic production in 1990-1991. The relatively high rates of growth projected for the domestic production of the coal and other basic metal products[10/]

industries, can be largely attributed to the rapid rate of growth in exports projected for these industries. In contrast relatively low rates of growth of domestic production are projected for the sheep and cereal grains, other farming, fishing, trapping and hunting, fruit, vegetable oils and fats, flour, cereal, confectionery, and food products, n.e.c., industries, all of which are projected to achieve slow export growth over the period 1971-1972 to 1990-1991.

Footnotes

1. Details of the SNAPSHOT model are contained in Dixon, P.B., Harrower, J.D. and Powell, A.A. 'SNAPSHOT, a Long Term Economy Wide Model of Australia: Preliminary Outline', IMPACT Preliminary Working Paper, No. SP-01, Melbourne, February 1976, and Chapman, D. 'Endogenising Trade in the SNAPSHOT Model', Bureau of Industry Economics, Working Paper, 1981.

2. This disucssion draws heavily on work being conducted in the Bureau of Industry Economics. Preliminary results on the composition of the relevant matrices are contained in Chapman, D. op.cit. A Bureau of Industry Economics report The Long-Run Impact of Technological Changes on the Structure of Australian Industry to 1990-1991, AGPS, Canberra, 1981, contains the final results and a full description of the methodology.

3. The Intermediate Inputs Coefficients Matrix (A)
This 109 industry by 109 industry matrix shows the intermediate inputs of goods and services required (on average) to be supplied by every other industry in order for an industry to produce one unit of industry output. That is (aij) indicates the quantity of intermdiate inputs to be supplied by industry i in producing one unit of the jth industry's output. The matrix corresponds to that published by ABS, Australian National Accounts, Input-output Tables, 1974-1975, Cat. No. 5209-0, and titled 'direct requirements coefficients matrix, basic values with indirect allocation of imports'.

4. The Capital Coefficients Matrix (K)
This is also a 109 industry by 109 industry matrix. The elements show a quantity of capital stock of each type required for each unit of an industry's output capacity. That is, (kij) shows the quantity of capital goods originating from industry i necessary for each unit of industry j's output capacity. The numbers do not relate to any particular plant but represent industry averages. In practice there are only about twenty industries which supply capital equipment items, so, although the matrix notionally has 109 x 109 elements, many of these are zero.

5. Labour Coefficients Matrix (L)
This nine occupation by 109 industry matrix shows the number of persons from each occupational group required to produce one unit of annual output in each industry. That is, (l_{hj}) shows the number of persons having occupations in category h required on average for each unit of annual output from industry j. The numbers do not correspond to employment in any particular form, but are simply an average of the number of persons of each type employed by the industry over a particular year, divided by the total value of the industry's output produced in that year.

6. For example, see Anne P. Carter, Structural Change in the American Economy. Harvard Studies in Technology and Societies. Harvard University Press, Cambridge, Massachusetts 1970.

7. A detailed description of the derivation of the changes in the three technology matrices is contained in Bureau of Industry Economics, The Long Run Impact of Technological Changes on the Structure of Australian Industry to 1990-1991, AGPS, Canberra, 1981.

8. The lack of a complete set of 1977-1978 data meant that many of the exogenous inputs for the base year had to be estimated, and hence the results are not presented in detail in this report.

9. Although SNAPSHOT provides estimates of domestic production in 1990-1991 for all 109 input-output industries, data is only presented in this and subsequent chapters on a fifty-four industry classification. This was necessitated by problems such as the substitutability between certain input-output categories.

10. Alumina and aluminium are included in the other basic metal products industries.

Table 6.1: Export levels, 1971-1972 and base scenario 1990-1991

		Actual exports 1971-72 ($ millions)	Projected growth rate 1971-72 to 1990-91 (per cent per annum)	Projected exports 1990-91 ($ millions)
01	Sheep and cereal grains	415.2	2.4	1431.6
02	Cattle, pigs, poultry	10.6	3.0	18.6
03	Other farming	63.4	1.0	76.6
04	Services to agriculture (a)	-	-	-
05	Forestry, logging	0.4	3.0	0.7
06	Fishing, trapping, hunting	59.7	2.0	86.5
07	Iron	273.1	3.5	525.0
08	Other metallic minerals	205.6	4.3	465.9
09	Coal	155.2	9.5	949.2
10	Other non-metallic minerals	13.9	3.0	24.4
11	Services to mining (a)	-	-	-
12	Meat products	649.6	5.2	1732.9
13	Milk products	115.8	1.0	139.9
14	Fruit, vegetable oils and fats	41.8	1.0	51.9
15	Flour, cereal, confectionary products	52.2	2.1	78.1
16	Food products n.e.c.	220.5	-2.0	150.2
17	Beverages	28.2	6.2	90.2
18	Tobacco products	1.9	3.0	3.3
19	Textile products	82.2	3.2	150.0
20	Clothing, footwear	8.2	3.0	14.4
21	Timber products, furniture	16.1	3.0	28.2
22	Paper products	7.6	3.0	13.4
23	Printing products	12.6	3.8	25.7
24	Chemicals	81.4	2.1	121.3
25	Petroleum, coal products	37.1	9.5	226.9
26	Non-metallic mineral products	8.7	2.9	15.1
27	Basic iron and steel	171.1	0.0	171.1
28	Other basic metal products	431.0	7.7	1860.1
29	Fabricated metal products	50.0	3.0	87.7
30	Motor vehicles and parts	121.1	4.0	256.6
31	Other transport equipment	53.4	3.5	103.9
32	Scientific, electronic equipment	36.9	4.0	77.8
33	Household appliances	14.3	3.9	30.1
3	Other machinery, equipment	135.4	4.3	308.7
35	Leather products	5.5	2.9	9.6
36	Rubber, plastic products	18.8	3.5	36.9
37	Other manufacturing	29.5	2.0	43.0
38	Electricity (a)	-	-	-
39	Gas (a)	-	-	-
40	Water, sewerage, drainage (a)	-	-	-
41	Building, construction (a)	-	-	-
42	Wholesale trade	319.1	2.4	503.4
43	Retail trade (a)	-	-	-
44	Repairs (a)	-	-	-

Table 6.1 (continued)

		Actual exports 1971-72 ($ millions)	Projected growth rate 1971-72 to 1990-91 (per cent per annum)	Projected exports 1990-91 ($ millions)
45	Road transport	208.7	3.5	408.4
45	Rail transport	148.7	5.9	460.1
47	Water transport	301.9	3.0	529.4
48	Air transport	173.0	3.0	303.4
49	Communications	15.0	3.0	26.3
50	Banks, finance, insurance	7.5	3.0	13.2
51	Property, business services	81.4	1.0	98.3
52	Public administration, community services	39.1	1.4	50.9
53	Recreation, personal, other services	0.6	3.2	1.1
54	Crude petroleum (a)	-	-	60.0 (b)
Total		5423.0	4.1	11860.0

Source: Data supplied by IMPACT project.

Notes: (a) No exports in 1971-1972.
(b) BIE estimate.

Table 6.2 : World commodity price scenario, 1990-91.

Input-output industry			Projected relative 1990-91 export prices f.o.b.	Projected relative 1990-91 import prices c.i.f.	Projected growth rates in world prices 1971-72 to 1990-91[a] (per cent per annum)
001	01.01	Sheep	1.457	1.471	2.0
002	01.02	Cereal grains	1.000	1.010	0.0
003	01.03	Meat cattle	0.800	1.000	0.0
004	01.04	Milk cattle and pigs	1.000	1.010	0.0
005	01.05	Poultry	1.000	1.010	0.0
006	01.06	Other farming	0.616	0.816	0.0
007	02.00	Services to agriculture [b]	-	-	-
008	03.00	Forestry and logging	0.800	1.000	0.0
009	04.00	Fishing, trapping, hunting	1.457	1.471	2.0
010	11.01	Iron	1.120	1.132	0.6
011	11.02	Other metallic minerals	1.120	1.132	0.6
012	12.00	Coal	1.400	1.414	1.8
013	14.00	Non-metallic n.e.c.	0.894	1.112	0.6
014	16.00	Services to mining [b]	-	-	-
015	21.01	Meat products	1.569	1.5[illegible]	2.4
016	21.02	Milk products	1.254	1.26[illegible]	1.2
017	21.03	Fruit and vegetable products	1.000	1.010	0.0
018	21.04	Margarine, oils and fats	0.934	1.180	1.0
019	21.05	Flour and cereal products	1.000	1.010	0.0
020	21.06	Bread, cakes and biscuits	0.952	1.194	1.0
021	21.07	Confectionery products	0.748	0.943	-0.13
022	21.08	Food products n.e.c.	0.976	0.985	-0.13
023	21.09	Soft drinks, cordials etc.	1.000	1.010	0.0
024	21.10	Beer and malt	1.000	1.010	0.0
025	21.11	Alcoholic beverages n.e.c.	0.377	0.619	1.0
026	22.01	Tobacco products	0.297	0.539	1.0
027	23.01	Prepared fibres	1,327	1.340	1.5
028	23.02	Man-made fibres, yarns, etc.	0.940	1.206	1.5
029	23.03	Cotton, silk, flax yarns etc.	0.725	0.918	-0.2
030	23.04	Wool and worsted yarns etc.	0.909	1.175	1.5
031	23.05	Textile finishing	0.770	0.963	-0.2
032	23.06	Textile floor covering	0.698	0.891	-0.2
033	23.07	Textile products n.e.c.	0.736	0.928	-0.2
034	24.01	Knitting mills	0.509	0.702	-0.2
035	24.02	Clothing	0.594	0.786	-0.2
036	24.03	Footwear	0.596	0.788	-0.2
037	25.01	Sawmill products	0.731	0.923	-0.2
038	25.02	Plywood, veneers and boards	0.631	0.823	-0.2
039	25.03	Joinery and wood products	0.702	0.894	-0.2
040	25.04	Furniture, mattresses, brooms	0.652	0.845	-0.2
041	26.01	Pulp, paper and paperboard	1.030	1.296	1.5
042	26.02	Fibreboard, paper containers	1.030	1.296	1.5
043	26.03	Paper products n.e.c.	0.986	1.251	1.5
044	26.04	Newspapers and books	1.059	1.324	1.5
045	26.05	Commercial and job printing	0.968	1.228	1.5
046	27.01	Chemical fertilizers	1.062	1.327	1.5
047	27.02	Industrial chemicals n.e.c.	1.033	1.298	1.5
048	27.03	Paints, varnishes, lacquers	0.980	1.245	1.5
049	27.04	Pharmaceutical and chemicals	1.040	1.306	1.5
050	27.05	Soap and other detergents	0.941	1.206	1.5
051	27.06	Cosmetic, toilet preparations	0.897	1.162	1.5
052	27.07	Chemical products n.e.c.	1.030	1.296	1.5
053	27.08	Petroleum and coal products	1.165	1.457	2.0
054	28.01	Glass, glass products	0.714	0.906	-0.2

Table 6.2 : World commodity price scenario, 1990-91 (continued)

055	28.02	Clay products	0.680	0.872	-0.2
056	28.03	Cement	0.770	0.963	-0.2
057	28.04	Ready mixed concrete	0.800	1.000	0.0
058	28.05	Concrete products	1.000	1.010	0.0
059	28.06	Non-metallic mineral prods	0.730	0.922	-0.2
060	29.01	Basic iron and steel	0.963	0.972	-0.2
061	29.02	Other basic metal products	0.963	0.972	-0.2
062	31.01	Structural metal products	0.743	0.935	-0.2
063	31.02	Sheet metal products	0.963	0.972	-0.2
064	31.03	Metal products n.e.c.	0.690	0.883	-0.2
065	32.01	Motor vehicles and parts	0.412	0.529	-2.8
066	32.02	Ship and boat building	0.464	0.580	-2.8
067	32.03	Locomotives, rolling stock	0.400	0.517	-2.8
068	32.04	Aircraft building	0.466	0.583	-2.8
069	33.01	Scientific equipment etc.	0.434	0.551	-2.8
070	33.02	Electronic equipment	0.424	0.541	-2.8
071	33.03	Household appliances n.e.c.	0.403	0.520	-2.8
072	33.04	Electrical machinery n.e.c.	0.432	0.549	-2.8
073	33.05	Agricultural machinery	0.445	0.562	-2.8
074	33.06	Construction etc, equipment	0.429	0.545	-2.8
075	33.07	Other machinery, equipment	0.437	0.554	-2.8
076	34.01	Leather products	0.998	1.295	2.1
077	34.02	Rubber products	0.676	0.869	-0.2
078	34.03	Plastic and related products	0.666	0.859	-0.2
079	34.04	Signs, writing equipment etc.	0.957	1.222	1.5
080	34.05	Other manufacturing	0.682	0.874	-0.2
081	36.01	Electricity (b)	-	-	-
082	26.03	Gas (b)	-	-	-
083	37.01	Water, sewerage and drainage	-	-	-
084	41.01	Residential buildings (b)	-	-	-
085	41.02	Building nec, construction (b)	-	-	-
086	46.01	Wholesale trade	1.000	1.010	0.0
087	48.01	Retail trade (b)	-	-	-
088	48.02	Motor vehicle repairs (b)	-	-	-
089	48.03	Other repairs (b)	-	-	-
090	51.01	Road transport	1.000	1.010	0.0
091	52.01	Rail transport	1.000	1.010	0.0
092	53.01	Water transport	1.000	1.010	0.0
093	54.01	Air transport	0.800	1.000	0.0
094	55.01	Communication	0.800	1.000	0.0
095	61.01	Banking	-	-	-
096	61.02	Finance and life insurance	0.800	1.000	0.0
097	61.03	Other insurance	1.000	1.010	0.0
098	61.04	Investment, real estate etc.	1.000	1.010	0.0
099	61.05	Other business services	0.800	1.000	0.0
100	61.06	Ownership of dwellings (b)	-	-	-
101	71.01	Public administration	0.800	1.000	0.0
102	72.01	Defence	0.800	1.000	0.0
103	81.01	Health (b)	-	-	-
104	82.01	Education, libraries etc. (b)	-	-	-
105	83.01	Welfare services (b)	-	-	-
106	91.01	Entertainment	0.800	1.000	0.0
107	92.01	Restaurants, hotels, clubs	0.800	1.000	0.0
108	93.01	Personal services	0.800	1.000	0.0
109	11.02	Crude petroleum	2.000	2.200	4.2

Source : IMPACT, except for industries 12 and 109 which are BIE estimates.

Notes : a. The world price projections have been normalised so that the average growth rate is zero.

b. Strictly non-traded on the basis of 1971-72 trade data.

Table 6.3 : Price elasticities of exports and imports

			Price elasticity of exports	Price elasticity of imports
001	01.01	Sheep	2.000	.500
002	01.02	Cereal grains	10.000	.500
003	01.03	Meat cattle	1.000	2.000
004	01.04	Milk cattle and pigs	1.000	2.000
005	01.05	Poultry	1.000	2.000
006	01.06	Other farming	1.000	2.000
007	02.00	Services to agriculture	0.000	2.000
008	03.00	Forestry and logging	1.000	2.000
009	04.00	Fishing, trapping, hunting	2.000	.500
010	11.01	Iron	2.000	.500
011	11.02	Other metallic minerals	5.000	.500
012	12.01	Coal	2.500	.500
013	14.00	Non-metallic n.e.c.	1.000	2.000
014	16.00	Services to mining	0.000	2.000
015	21.01	Meat products	2.500	.500
016	21.02	Milk products	5.000	2.000
017	21.03	Fruit and vegetable products	5.000	1.100
018	21.04	Margarine, oils and fats	5.000	1.700
019	21.05	Flour and cereal products	5.000	2.100
020	21.06	Bread, cakes and biscuits	5.000	2.100
021	21.07	Confectionery products	5.000	2.000
022	21.08	Food products n.e.c.	3.000	.500
023	21.09	Soft drinks, cordials etc.	2.000	2.000
024	21.10	Beer and malt	2.000	2.100
025	21.11	Alcoholic beverages n.e.c.	2.000	2.100
026	22.01	Tobacco products	2.000	.001
027	23.01	Prepared fibres	2.600	.500
028	23.02	Man-made fibres, yarns etc	2.000	2.400
029	23.03	Cotton, silk, flax yarns etc.	2.000	2.400
030	23.04	Wool and worsted yarns etc.	2.000	.500
031	23.05	Textile finishing	2.000	2.000
032	23.06	Textile floor covering	2.000	2.000
033	23.07	Textile products n.e.c.	2.000	2.400
034	24.01	Knitting mills	2.000	2.900
035	24.02	Clothing	2.000	3.400
036	24.03	Footwear	2.000	6.800
037	25.01	Sawmill products	2.000	2.000
038	25.02	Plywood, veneers and boards	2.000	2.000
039	25.03	Joinery and wood products	2.000	2.000
040	25.04	Furniture, mattresses, brooms	2.000	1.900
041	26.01	Pulp, paper and paperboard	2.000	1.100
042	26.02	Fibreboard, paper containers	2.000	1.100
043	26.03	Paper products n.e.c.	2.000	1.100
044	26.04	Newspapers and books	2.000	2.000
045	26.05	Commercial and job printing	2.000	2.000
046	27.01	Chemical fertilizers	5.000	1.400
047	27.02	Industrial chemicals n.e.c.	5.000	1.700
048	27.03	Paints, varnishes, lacquers	5.000	2.000
049	27.04	Pharmaceuticals and chemicals	5.000	2.000
050	27.05	Soap and other detergents	5.000	1.200
051	27.06	Cosmetic, toilet preparations	5.000	2.000
052	27.07	Chemical products n.e.c.	5.000	2.000
053	27.08	Petroleum and coal products	2.000	.340
054	28.01	Glass, glass products	5.000	1.400
055	28.02	Clay products	2.000	1.400
056	28.03	Cement	0.000	.800
057	28.04	Ready-mixed concrete	0.000	1.300
058	28.05	Concrete products	2.000	1.300
059	28.06	Non-metallic mineral products	2.000	1.300
060	29.01	Basic iron and steel	2.000	.500

Table 6.3 : Price elasticities of exports and imports

			Price elasticity of exports	Price elasticity of imports
061	29.02	Other basic metal products	3.000	.500
062	31.01	Structural metal products	2.000	1.500
063	31.02	Sheet metal products	2.000	1.500
064	31.03	Metal products n.e.c.	2.000	2.000
065	32.01	Motor vehicles and parts	2.000	5.000
066	32.02	Ship and boat building	2.000	.500
067	32.03	Locomotives, rolling stock	0.000	.500
068	32.04	Aircraft building	2.000	.500
069	33.01	Scientific equipment etc	2.000	.500
070	33.02	Electronic equipment	2.000	2.000
071	33.03	Household applicances n.e.c.	2.000	2.100
072	33.04	Electrical machinery n.e.c.	2.000	1.300
073	33.05	Agricultural machinery	2.000	.500
074	33.06	Construction etc. equipment	2.000	.500
075	33.07	Other machinery, equipment	2.000	.500
076	34.01	Leather products	3.000	2.000
077	34.02	Rubber products	2.000	1.300
078	34.03	Plastic and related products	5.000	1.300
079	34.04	Signs, writing equipment etc.	2.000	2.000
080	34.05	Other manufacturing	2.000	1.200
081	36.01	Electricity	0.000	2.000
082	36.02	Gas	0.000	2.000
083	37.01	Water, sewerage and drainage	0.000	2.000
084	41.01	Residential buildings	0.000	2.000
085	41.02	Building n.e.c., construction	0.000	2.000
086	46.01	Wholesale trade	2.000	2.000
087	48.01	Retail trade	0.000	2.000
088	48.02	Motor vehicle repairs	0.000	2.000
089	48.03	Other repairs	0.000	2.000
090	51.01	Road transport	0.000	2.000
091	52.01	Rail transport	0.000	2.000
092	53.01	Water transport	2.000	2.000
093	54.01	Air transport	2.000	2.000
094	55.01	Communication	2.000	2.000
095	61.01	Banking	0.000	2.000
096	61.02	Finance and life insurance	0.000	2.000
097	61.03	Other insurance	2.000	2.000
098	61.04	Investment, real estate etc.	0.000	2.000
099	61.05	Other business services	0.000	2.000
100	61.06	Ownership of dwellings	0.000	2.000
101	71.01	Public administration	0.000	2.000
102	72.01	Defence	0.000	2.000
103	81.01	Health	0.000	2.000
104	82.01	Education, libraries, etc.	0.000	2.000
105	83.01	Welfare services	0.000	2.000
106	91.01	Entertainment	0.000	2.000
107	92.01	Restaurants, hotels, clubs	2.000	2.000
109	93.01	Personal services	0.000	2.000
109	12.02	Crude petroleum	2.000	.500

Source: IMPACT documentation.

Table 6.4 : Import Penetration Shares, 1974-75

Input-output industry			Import ratio[a] (%)
001	01.01	Sheep	0.0
002	01.02	Cereal grains	0.1
003	01.03	Meat cattle	0.5
004	01.04	Milk cattle and pigs	0.0
005	01.05	Poultry	0.0
006	01.06	Other farming	6.1
007	02.00	Services to agriculture	0.0
008	03.00	Forestry and logging	1.6
009	04.00	Fishing, trapping, hunting	5.1
010	11.01	Iron	0.1
011	11.02	Other metallic minerals	1.5
012	12.00	Coal	0.0
013	14.00	Non-metallic n.e.c.	11.2
014	16.00	Services to mining	0.0
015	21.01	Meat products	0.7
016	21.02	Milk products	1.7
017	21.03	Fruit and vegetable products	17.7
018	21.04	Margarine, oils and fats	30.3
019	21.05	Flour and cereal products	0.8
020	21.06	Bread, cakes and biscuits	1.3
021	21.07	Confectionery products	14.7
022	21.08	Food products n.e.c.	5.6
023	21.09	Soft drinks, cordials etc.	0.5
024	21.10	Beer and malt	0.1
025	21.11	Alcoholic beverages n.e.c.	35.3
026	22.01	Tobacco products	12.8
027	23.01	Prepared fibres	12.7
028	23.02	Man-made fibres, yarns, etc.	102.1
029	23.03	Cotton, silk, flax yarns etc.	115.4
030	23.04	Wool and worsted yarns etc.	14.8
031	23.05	Textile finishing	0.0
032	23.06	Textile floor covering	35.6
033	23.07	Textile products n.e.c.	33.3
034	24.01	Knitting mills	34.3
035	24.02	Clothing	26.5
036	24.03	Footwear	36.8
037	25.01	Sawmill products	25.1
038	25.02	Plywood, veneers and boards	18.3
039	25.03	Joinery and wood products	6.8
040	25.04	Furniture, mattresses, brooms	5.6
041	26.01	Pulp, paper and paperboard	101.7
042	26.02	Fibreboard, paper containers	5.6
043	26.03	Paper products n.e.c.	11.9
044	26.04	Newspapers and books	23.6
045	26.05	Commercial and job printing	3.3
046	27.01	Chemical fertilizers	6.3
047	27.02	Industrial chemicals n.e.c.	110.0
048	27.03	Paints, varnishes, lacquers	5.6
049	27.04	Pharmaceutical and chemicals	31.6
050	27.05	Soap and other detergents	6.5
051	27.06	Cosmetic, toilet preparations	7.9
052	27.07	Chemical products n.e.c.	56.2
053	27.08	Petroleum and coal products	44.0
054	28.01	Glass, glass products	37.0

Table 6.4 : Import Penetration Shares, 1974-75 (continued)

055	28.02	Clay products	24.4
056	28.03	Cement	2.6
057	28.04	Ready mixed concrete	0.0
058	28.05	Concrete products	0.2
059	28.06	Non-metallic mineral prods	25.4
060	29.01	Basic iron and steel	14.7
061	29.02	Other basic metal products	3.9
062	31.01	Structural metal products	1.2
063	31.02	Sheet metal products	2.9
064	31.03	Metal products n.e.c.	29.7
065	32.01	Motor vehicles and parts	36.1
066	32.02	Ship and boat building	18.9
067	32.03	Locomotives, rolling stock	2.9
068	32.04	Aircraft building	135.9
069	33.01	Scientific equipment etc.	166.1
070	33.02	Electronic equipment	82.5
071	33.03	Household appliances n.e.c.	32.1
072	33.04	Electrical machinery n.e.c.	38.0
073	33.05	Agricultural machinery	59.8
074	33.06	Construction etc. equipment	58.2
075	33.07	Other machinery, equipment	105.2
076	34.01	Leather products	19.9
077	34.02	Rubber products	41.2
078	34.03	Plastic and related products	25.8
079	34.04	Signs, writing equipment etc.	13.3
080	34.05	Other manufacturing	77.2
081	36.01	Electricity	0.0
082	26.03	Gas	0.0
083	37.01	Water, sewerage and drainage	0.0
084	41.01	Residential buildings	0.0
085	41.02	Building n.e.c., construction	0.0
086	46.01	Wholesale trade	0.0
087	48.01	Retail trade	0.0
088	48.02	Motor vehicle repairs	0.0
089	48.03	Other repairs	0.0
090	51.01	Road transport	0.0
091	52.01	Rail transport	1.8
092	53.01	Water transport	9.8
093	54.01	Air transport	28.4
094	55.01	Communication	2.7
095	61.01	Banking	0.0
096	61.02	Finance and life insurance	0.2
097	61.03	Other insurance	1.1
098	61.04	Investment, real estate etc.	1.2
099	61.05	Other business services	3.1
100	61.06	Ownership of dwellings	0.0
101	71.01	Public administration	0.0
102	72.01	Defence	0.0
103	81.01	Health	0.0
104	82.01	Education, libraries etc.	0.0
105	83.01	Welfare services	0.0
106	91.01	Entertainment	5.4
107	92.01	Restaurants, hotels, clubs	0.2
108	93.01	Personal services	0.4
109		Crude petroleum	43.0(b)

Source : Australian Bureau of Statistics, National Accounts Input-Output Tables, 1974-75 No. 5209.0 and data supplied by the Industries Assistance Commission.

Notes : (a) Imports plus duty as a ratio of domestic production. The ratios were calculated so as to exclude intra-industry flows in domestic production, ie. with the main diagonal of the Input-Output Table set to zero.

(b) BIE estimate on the assumption of 70 per cent self sufficiency in crude petroleum.

Table 6.5: Base scenario macro-economic indicators, 1971-1972 and 1990-1991

Item	Actual 1971-72 (a)		1990-91 - base scenario projections (b)	
Consumption (c)(d)	22.2	(5.0)	64.7	(5.8)
Gross investment (e)	9.4	(6.9)	22.0	(4.6)
Government purchases (f)	4.9	(5.9)	11.8	(4.7)
Exports	5.4	(8.4)	11.3	(4.0)
Imports (g)	-5.0	(6.5)	-13.6	(5.4)
GDP	36.9	(5.5)	96.2	(5.2)
Workforce (h)	5.1	(2.7)	7.75	(2.2)
GDP/worker (i)	7235	(2.8)	12413	(2.9)
Average wage (j)	4237		8135	(3.5)
Consumption/person (k)	1740	(3.0)	3924	(4.4)
GDP/person	2893	(3.5)	5835	(3.8)
Investment/GDP (l)	25.5		.9	

Source: IMPACT documentation.

Notes:
(a) Average growth rates (per cent per annum) for 1962-1963 to 1971-1972 are in parentheses beside the actual data for 1971-1972.
(b) Average growth rates (per cent per annum) for 1971-1972 to 1990-1991 are in parentheses beside the projections for 1990-1991.
(c) Consumption, investment, government expenditure, exports, imports and GDP are measured in 1971-1972 prices, $ billions.
(d) Includes net taxes on consumption.
(e) Includes net taxes on investment.
(f) Government expenditure, exports and workforce projections are exogenous to SNAPSHOT.
(g) Trade was assumed to be balanced in 1990-1991 on foreign exchange account i.e. foreign exchange value of exports equals foreign exchange cost of imports. However, the data presented here are valued at 1971-1972 prices. Valued in this way, imports exceed exports in 1990-1991 because of tariffs in the base year and favourable movements in the terms of trade over 1971-1972 to 1990-1991.
(h) Measured in millions.
(i) GDP/worker, average wage, consumption/person and GDP/person are measured in 1971-1972 prices.
(j) Total annual wage bill/workforce, in dollars.
(k) The population for 1971-1972 is 12.756 million and population projected for 1990-1991 is 16.488 million.
(l) Measured as a percentage.

Table 6.6 : Base scenario occupational employment, 1971-72 and 1990-91.

Occupation	Number employed 1971-72 '000	Percentage contribution to total employment 1971-72	Projected number employed 1990-91 '000	Percentage contribution to total employment 1990-91	Average annual growth 1971-72 to 1990-91
Professional white collar	193.3	3.8	318.3	4.1	2.7
Skilled white collar	668.9	13.1	1199.0	15.5	3.1
Semi-and unskilled white collar	1,367.3	26.8	1850.9	23.9	1.6
Skilled blue collar-metal and electrical	516.5	10.1	821.5	10.6	2.5
Skilled blue collar - building	202.3	4.0	363.7	4.7	3.1
Skilled blue collar - other	142.8	2.8	214.7	2.8	2.2
Semi-and unskilled blue collar	1,539.6	30.2	2402.6	31.0	2.4
Rural workers	402.2	7.9	481.0	6.2	0.9
Armed services	65.7	1.3	96.0	1.2	2.0
Total	5,098.6	100.0	7,747.6	100.0	2.2

Source: Australian Bureau of Statistics, 1971 Population Census and IMPACT documentation.

Table 6.7 : Base scenario industry production levels, 1971-72 and 1990-91

		Actual production 1971-72	Projected production 1990-91 constant prices	Projected growth rate 1971-72 to 1990-91 per cent per annum	Ranking of projected growth rates
		$millions	$millions		
001	Sheep and cereal grains	1316.9	2564.9	3.6	40
002	Cattle, pigs and poultry	1359.6	2912.7	4.1	35
003	Other farming	658.3	1455.0	4.3	32
004	Services to agriculture	219.8	464.3	4.0	36
005	Forestry and logging	158.4	319.9	3.8	38
006	Fishing, trapping and hunting	94.1	178.6	3.4	46
007	Iron	344.3	662.4	3.5	45
008	Other metallic minerals	535.1	1400.8	5.2	18
009	Coal	363.4	2103.8	9.7	1
010	Non-metallic n.e.c.	182.4	466.2	5.1	20
011	Services to mining	36.7	132.3	7.0	4
012	Meat products	1816.8	3856.2	4.0	37
013	Milk products	680.0	1278.9	3.4	47
014	Fruit, vegetable oils, fats	378.3	642.8	2.8	53
015	Flour, cereal, confectionery	763.4	1489.7	3.6	41
016	Food products n.e.c.	630.5	1156.5	3.2	51
017	Beverages	539.7	1676.4	6.1	8
018	Tobacco products	208.3	386.8	3.3	50
019	Textile products	1030.5	2083.8	3.8	39
020	Clothing and footwear	788.0	1295.6	2.7	54
021	Timber and furniture	933.3	2934.1	6.2	6
022	Paper products	604.8	1189.0	3.6	44
023	Printing products	965.5	2341.4	5.4	17
024	Chemicals	1254.1	3008.7	4.7	23
025	Petroleum and coal products	589.1	1376.2	4.7	24
026	Non-metallic mineral products	932.8	2718.6	5.8	14
027	Basic iron and steel	1084.8	2053.4	3.4	48
028	Other basic metal products	876.0	2740.0	6.2	7
029	Fabricated metal products	1610.0	3721.4	4.5	30
030	Motor vehicles and parts	1439.3	2537.8	3.0	52
031	Other transport equipment	520.0	1180.9	4.4	31
032	Scientific and electronic equipment	431.8	937.9	4.2	34
033	Household appliances	401.9	1208.3	6.0	9
034	Other machinery and equipment	1591.9	3135.7	3.6	42
035	Leather products	88.8	197.6	4.3	33
036	Rubber and plastic products	685.9	2681.4	7.4	2
037	Other manufacturing	161.6	473.5	5.8	13
038	Electricity	971.0	3251.1	6.6	5
039	Gas	121.2	284.8	4.6	25
040	Water, sewerage and drainage	442.3	1041.2	4.6	26
041	Building and construction	6499.3	18303.0	5.6	15
042	Wholesale trade	3954.4	9608.4	4.8	21
043	Retail trade	3253.0	8468.5	5.2	19
044	Repairs	931.5	2809.2	6.0	10
045	Road transport	1737.2	3947.3	4.4	29
046	Rail transport	769.9	2123.8	5.5	16
047	Water transport	728.2	1436.1	3.6	43
048	Air transport	394.8	1197.8	6.0	11
049	Communications	1171.8	3497.8	5.9	12
050	Banks, finance, insurance	1931.1	4446.3	4.5	28
051	Property and business services	5375.4	12523.0	4.6	27
052	Public administration and community services	6143.9	14996.9	4.8	22
053	Recreation, personal services	2209.5	8166.5	7.1	3
054	Crude petroleum	261.6	490.7	3.4	49

Source : IMPACT documentation.

Table 6.8 : Share of value added by sector under the base scenario, 1962-63, 1971-72 and 1990-91 (current prices)

Sector	Actual 1962-63	Actual 1971-72	Projected 1990-91
Agriculture	12.1	6.7	6.0
Mining	1.7	3.7	4.3
Manufacturing	30.1	22.8	19.3
Tertiary	56.1	66.8	70.4
Total	100.0	100.0	100.0

Sources: Australian Bureau of Statistics, Australian National Accounts, Input-Output Tables, 1962-63.

IMPACT update of 1968-69 input-output table for 1971-72.

SNAPSHOT projections for 1990-91.

CHAPTER 7. ASSESSMENT OF THE PREDICTED INDUSTRY STRUCTURE

7.1 Introduction

The purpose of this chapter is to provide an assessment of the projected industrial structure given in Chapter 6.

The starting point in such an assessment is to examine certain characteristics of the model and the accuracy of the exogenous inputs. In Appendix 2 it is pointed out that validation experiments have demonstrated the model's ability to provide accurate forecasts of industry performances, given the correct values of the exogenous variables. It follows then that if the best guess values of the exogenous variables used in the base scenario are accurate, the projected industry structure should also be accurate. However it is important to emhasize that while the values for 1990 of the exogenous variables adopted in the previous chapter are considered to be the most likely given the amount of information currently available, it is difficult to place confidence intervals around these values.

Factors such as capital constraints, environmental considerations, industrial relations and local skill shortages, which are not easily included in any long term projections of the exogenous variables, could cause the actual 1990 values to be quite different from the values assumed in the base scenario. To overcome, in part, this uncertainty surrounding the future values of the exogenous inputs, Appendix 2 tests the sensitivity of the base scenario projections to changes in the assumed levels of these exogenous variables. The results of these sensitivity tests are called upon in this chapter to aid in the assessment of the predicted industrial structure.

Before proceeding with a detailed review of base scenario results it is also important to recall that they are based on the assumption that 1990-1991 will be an average year. It is assumed, for example, that during 1990-1991 the business cycle will be at neither trough or peak, there will not be an unusual level of industrial disputes, and rural output will not be affected by adverse weather conditions. Any variation in these or related assumptions could result in the projected industrial structure being out of line with the actual structure in the year 1990-1991. The importance of this feature of the model is demonstrated in Appendix 2, where it is shown that the base scenario macro results changed significantly in response to changes in the assumed level of employment. This assumption together with the possibility of inaccuracies in the forecast values of the exogenous variables means that the results of the model are more an indication of the types of structural change and economic development rather than a precise estimate of this development.

7.2 Macro-economic results

The most striking feature of the macro-economic projections given in Chapter 6 is the magnitude of Australia's potential economic performance over the next decade. Real GDP is projected to grow at a rate of 5.2 per cent per annum while consumption per person, wages and GDP per person are projected to increase at real annual rates of 4.4, 3.5 and 3.8 per cent respectively over the period 1971-1972 to 1990-1991. As the annual growth in real GDP for the period 1971-1972 to 1977-1978 was only of the order of 3 per cent, an annual rate of growth of some 6.2 per cent will be needed over the period 1977-1978 to 1990-1991 in order to reach the absolute level of GDP projected in the base scenario.[1/] Nevertheless, while this projected growth rate of 5.2 per cent per annum is in marked contrast with the expectations of other developed countries, it is only slightly above the OECD high growth scenario projections of 4.8 per cent average annual increase in real world GDP over the period 1975 to 1990 (Table 1.12).

The explanation for the projected improvement in Australia's economic performance lies in a number of factors. First it was noted in Section 1.5 that a significant part of the basis for the pessimistic expectations in other developed countries is the expected adverse effects of increasing energy prices. Australia, in contrast, is likely to benefit from the increasing price of energy due to the existence of large deposits of low cost energy products. This large supply of energy, together with the current and expected strong inflow of capital to exploit this energy base, will ensure that Australia's current position as a net exporter of these products will be considerably strengthened over the next decade. Exploitation of this energy base will also provide considerable impetus to domestic manufacturing, particularly in the mineral processing and construction industries. Although Australia has already felt to some extent, the impact of the development of this energy base, most of the major resource developments are scheduled to occur during the 1980s. The scale of these developments will provide a powerful stimulus to the economy and lead to a significant improvement in Australia's economic performance.[2/]

A further reason for expecting strong growth in Australia's level of economic activity is the projected continuing increase in the level of the labour force. In Chapter 2 it was pointed out that the reasons for this increase lie in the growing proportion of the population of employable age and the projected increase in the labour force participation rates. If it is possible to reduce the rate of unemployment as is assumed in the base scenario projection, this increased labour force will also supply a strong impetus to growth. Most recent economic indicators suggest that Australia is moving out of the recession of the mid and late 1970s and the likelihood of the continuation of this trend, together with the forces for growth identified in this report, suggest that the assumed decline in the rate of unemployment should be possible by 1990-1991.

Productivity improvements are also likely to have a positive affect on improving Australia's economic growth. It was noted in Chapter 2 that improvements in labour productivity are expected to increase rapidly over the next decade, due largely to the increased use of micro-electronics.

Furthermore, the changing demand patterns are expected to cause an improvement in the overall level of labour productivity and provide impetus to Australia's economic growth. From the results of Chapter 5, it can be seen that a number of the more labour intensive industries in the domestic economy, for example clothing, textiles and footwear, are expected to be amongst the slowest growing industries. In contrast, mining and mineral processing industries, which are all characterized by high output/labour ratios are all expected to be amongst the fastest growing industries.

Overall then, it appears that while it was argued in Chapter 6 that there are a number of reasons to suggest that the base scenario projections may be slightly over-estimated, the foregoing discussion indicates that Australia can expect substantial improvements in its economic performance over the next decade.

A result that gives some cause for concern regarding the validity of the base scenario projections is the projected 1990 level of 0.23 for the investment/GDP ratio. In Chapter 6 it was observed that although GDP was projected to grow at a similar rate over the period 1971-1972 to 1990-1991 to that achieved during the period 1962-1963 to 1971-1972, the investment ratio required to achieve this growth is less than the 0.25 required in the earlier period. Investment rates have declined during the 1970s and in 1978-1979 the ratio was only 0.22. The decline is no doubt due principally to the lower levels of economic activity. Nevertheless there is no evidence of a recovery in the ratio despite an improvement in Australia's economic growth rate in the latter part of the period. To some extent then the decline in the ratio may be due to structural shifts whereby capital is being used more productively. If so, then a lower investment ratio may be sufficient to sustain the projected level of economic growth.

There are a number of reasons, however, to suggest that the investment/GDP ratio is under-estimated. Chapter 2 suggested that environmental considerations and the effects of rising energy prices will add significantly to investment costs over the next decade. Until recently Australia's strong energy base has caused a certain complacency about the need for energy conservation. Much of the adjustment that has already taken place in many other industrialized countries has yet to be faced in Australia. Hence over the next decade considerable investment will be required in relation to oil conservation, the search for new energy reserves and the development of more energy efficient production processes and substitutes for oil in these production processes. In addition the growing awareness regarding the environment will require increasing investment in pollution control and in preserving the environmental amenity.

The impact of these two factors on investment was inadequately modelled in the base scenario projection and it is likely that the investment/GDP ratio is under-estimated. To the extent that the investment/GDP ratio is under-estimated, the consumption/GDP ratio is likely to be over-estimated to approximately the same extent. The consequences of the problems in estimating these two ratios on the projected industrial structure will be examined later in this chapter.

There is currently in Australia a growing awareness of the social problems associated with a rapid rate of technological change, particularly regarding the increased use of micro-electronics. Much of this concern is with the short-run social costs associated with people being displaced from their existing employment by technological developments, and the possibility that these people will be unable to find suitable alternative employment.

The recent report of the Commonwealth Government's Committee of Inquiry into Technological Change (Myers Report) took up these issues. The report argues that while certain technologies may reduce employment growth in some industries, the increased incomes generated by technological change form an important basis of economic growth and job creation. The net effect is dependent on which of these effects has the greatest impact.

Despite the Myers Report being in favour of proceeding with technological change, there is a possibility that pressure will be applied to reduce the rate of technological change over the next decade. This pressure would emerge if there is a strong adverse reaction from the community to the disruptions inherent in the anticipated technological changes.

In Appendix 2 the base scenario projections are tested for their sensitivity to an assumed lower rate of technological change. Decreasing the rate of technological change (as measured by increasing the labour/output ratio) resulted in a significant reduction in the level of GDP relative to the base scenario. In line with this reduction in GDP, the levels of consumption, investment, imports and exports are also lower than their base scenario levels. These results then support the findings of the Myers Report and suggest that although the structural pressures resulting from technological change will require positive attention, any attempt to reduce the rate of technological change will result in decreased competitiveness of domestic industries, and in considerable reduction in GDP and consequently also in the material living standards of the Australian population.

Finally, any assessment of the macroeconomic projections of Chapter 6 should recognize the fragile base on which the 1990 export prospects are built. In Chapter 4 a generally pessimistic view of world economic developments were counterbalanced by a more favourable impression of the outlook for the countries in the Asian region. Either of these themes could be mistaken and uncertainty surrounds the likely levels of Australian exports in 1990. However the analyses of Appendix 2 are of limited assistance in assessing the consequences of alternative export levels. The results there suggested that the macroeconomic variables were relatively insensitive to changes in the trade scenario. It must be recognized however, that SNAPSHOT is not designed to measure gains or losses from changes in the trade levels or patterns. Considerable modifications to its structure would be necessary to account for such effects as increased specialization and economies of scale. It follows then that the effects on the macroeconomic variables are probably underestimates of the actual changes that are likely to occur. It is not possible however to quantify the degree of this under-estimation.[3/]

7.3 Industrial structure

The projected industrial structure given in Chapter 6 reflects the strong growth evident in the macro-economic results. All industries are projected to have positive rates of growth over the period 1971-1972 to 1990-1991, with the differences between the rates of growth not being great in most cases. As noted in Chapter 6, the industries projected to have the fastest rates of growth are those closely associated with the exploitation of Australia's strong mineral and energy base (coal, electricity, other basic metal products and services to mining) and those producing goods with a high income elasticity of demand (recreation, personal services, air transport, building and construction, timber and furniture and beverages).

The preceding section has suggested that the projected level of GDP in 1990 is slightly over-estimated and that the investment output ratio may be under-estimated. Both of these factors point to an over-estimation of the level of consumption in 1990. However the level of investment is less clear as the factors may neutralize each other. In these circumstances there will be an uneven impact upon the projected industrial structure outlined in the last chapter. Industries primarily associated with consumption commodities will decline relative to those whose outputs are more directed to the provision of items such as buildings, plant and equipment. Even within the consumption oriented industries the impact of any over-estimation of GDP will be uneven; the industry growth rates of those luxury type items with high income elasticities will decline more than the growth rates of industries supplying the more basic consumption goods. These considerations suggest that there will probably be greater uniformity in industry growth rates in 1990 than indicated in the base scenario. Export oriented industries will be least effected and will continue to be amongst the highest growth industries.

In addition to these considerations, it was mentioned in section 7.1 that a number of factors likely to have an important impact on specific industry growth rates were not easily accommodated in the long-term projections. Of the factors mentioned, capital constraints and environmental considerations are likely to have the least serious impact. The discussion of the macroeconomic projections suggested that the investment GDP ratio would be about the same, or possibly lower than observed historically. Combined with a traditional level of capital inflow, domestic savings should be sufficient to remove this potential impediment to achieving the industrial structure outlined in Chapter 6. Environmental factors may be of more importance, however for most industries these factors are not major constraints to development and should not seriously deter industry growth. Those industries where environmental considerations are of more consequence are principally concerned with mineral processing and will tend to be located away from the major population centres. The environmental pressures are expected to be small compared to those of other Western countries, and the employment benefits of mineral processing will probably outweigh environmental considerations. To the extent that these two factors, capital constraints and environmental considerations, are important, they are likely to have a differential impact upon industry development, with the most adverse effects being felt by the larger, faster growing industries, especially mineral processing.

Skill shortages is another factor which could cause some differential shortfall in the projected industry growth rates. In the next section it is suggested that, overall, these shortages are unlikely to be a serious constraint on industry developments. However if temporary shortages do occur they are likely to be most severe in the more remote areas of Australia, i.e. where the fast growing mining and mineral processing developments are expected to be located.

The influence of industrial disputes upon the industrial structure is difficult to predict simply because they can occur in any industry and the consequences of protracted disruption to an industry's production are spread over a wide range of industries. In fact a series of stoppages in one industry may actually boost the growth rate of another industry producing substitute goods or services.[4/] The level of industrial disputes experienced during the 1970s are implicitly built into the export and technology scenarios described in Chapter 6 through the process of judging future export and technology prospects in part upon past performances. The eventual impact of industrial disputes upon the projected industry structure will depend upon the level of disputes in each industry over the next decade compared to the industry's dispute record during the 1970s.

Given the uncertainty whether these factors may occur, and if so, to what extent, it is difficult to assess their overall impact upon the projected industrial structure. It would appear though that the fast growing industries, especially those associated with mineral processing are the ones most likely to feel the immediate impact of such developments. The interrelated nature of the economy will cause other industries also to be indirectly affected and makes it impossible to decide how the industrial structure might shift. The net effect however would seem to compress growth rates in faster growing industries, leading to a greater uniformity of industry growth rates.

In assessing the base scenario macro-economic projections in section 7.2, concern was expressed regarding the possibility that pressures may be exerted to slow down the rate of technological change and hence that the assumed rate of technological change may be too high. The impact of an assumed lower rate of technological change in industry growth rates is examined in Appendix 2. There it was shown that delaying the rate of technological change adversely affects the growth of all industries. The industries whose growth rates are reduced the most are predominantly Australia's import-competing industries, and labour intensive exporting and service industries. These industries are all relatively intensive in their use of labour and tend to be particularly vulnerable to any changes in their labour/output ratio. Additionally, a number of major export industries (sheep and cereal grains, food products n.e.c., and other metallic minerals) which were assumed to have a high export price elasticity of demand were similarly affected by varying the rate of technological change. Exports from these industries and hence domestic production were susceptible to changes in price arising from different assumed levels of technological change.

Much of the current debate associated with the impact of technological change is centred on the service industries as it is in these industries that the adoption of microelectronic processes are expected to find most applications and the strongest pressures for a delay in the rate of technological change will be felt. The effects of a delay in the rate of technological change restricted to certain service industries on industry growth rate are explored in Bureau of Industry Economics Research Report No. 7. There it was found that the industries suffering the greatest decline in the relative rates of growth from such delays were not service industries but import competing industries. An important feature to emerge from this analysis was that delaying technological progress in one sector will have important repercussions throughout the whole economy. It can be inferred from this that there may be inherent dangers in an approach that seeks to maintain employment in one sector by increasing the labour/output ratio in that sector. Such an approach overlooks the interrelationships of economic activity and the problems that may be created for growth and employment in other sectors.

Two key elements in the likely level of 1990 exports, the level of world economic activity and the growth performance of countries in the Asian region, were identified in the previous section. It was recognized that considerable uncertainty surrounds these variables. These two elements will be important determinants of the future industrial structure. To assess the confidence which could be placed in the industry structure results of Chapter 6, two experiments were conducted in Appendix 2. In the first experiment all exports were increased; this would roughly correspond to a general improvement in the assumed level of world economic activity. In the second experiment only the export of manufacturing goods were increased.

When projected exports are increased by 20 per cent across the board, it is found in Appendix 2 that all import competing industries witness declines in their rate of growth as a result of the increased competition from imports, though these rates of growth all remained positive. Those import-competing industries with high levels of import penetration in the base scenario are most severely affected. On the other hand, all export industries witness increases in their rate of growth, as did the services to agriculture, services to mining and chemical fertilizers industries because of their high input into agriculture and mining, the main beneficiaries from increased exports.

When the increase in exports are confined to manufactured goods, import competing goods are still the worst affected. The growth rates shown in Chapter 6 for these industries would be over estimated. However there are also significant changes amongst other industry performances including improvements in some industries which produce non-traded goods and services such as electricity and wholesale trade. In general the growth rates of the export oriented manufacturing industries and those intermediate industries with close linkages to these industries would be under estimated by the base scenario.

Chapter 5 outlined the role of government in influencing the industrial structure. It was pointed out that the future directions of government policy would depend upon a large number of factors and could not be predicted with certainty. Consequently, the approach adopted in Chapter 6 was to assume that, broadly speaking, current policy would prevail during the 1980s. However the potential growth rate of the economy projected by SNAPSHOT may provide the government with an opportunity to move towards its long term objective for Australia's industrial structure, i.e. one which is more competitive internationally and less reliant upon government assistance. In these circumstances it is likely that, for some industries, the actual levels of import penetration in 1990 will be considerably different from those projected under the base scenario. For example, a decision to reduce substantially the high levels of protection currently available to the domestic clothing industry would result in a much higher level of import penetration than that projected for 1990-1991 in the base scenario. To the extent that the level of import penetration in certain industries is under-estimated, the import penetration levels in other more competitive industries will be over-estimated, as the total level of exports and hence imports is set exogenously within the model. The industries most likely to be subject to increased import competition were identified in Chapter 5. The net impact upon the industrial structure would be a shift towards more capital intensive industries. There would probably be a greater diversity of growth rates across industries than projected in Chapter 6.

7.4 Labour force

In Chapter 2 it was shown that as a result of lower population growth, labour force growth over the next decade would not be as rapid as in the 1970s. However, the effect of this will be mitigated to some extent by an increase in the proportion of the population of working age and increases in female labour force participation rates. Immigration policy will also have an important bearing on future labour force growth.

At the same time, changes in the skill requirements of industry will occur in response to structural pressure arising through such factors as import competition and technological change. These changes will also require a response on the supply side in terms of a restructuring of the workforce's skill profile. Such responses will be dependent upon a continuation of the trend towards a more educated workforce and the encouragement of immigration of people with skills not readily available in Australia.

The most noteworthy feature of the labour force projections presented in Chapter 6 is that only minor changes in the occupational distribution of the workforce in 1990-1991 are indicated. There will be employment growth in every occupational category, with demand for labour increasing most rapidly in skilled occupational categories. This reflects the strong growth in output projected for the building, construction and related industries and in a number of service industries. Below average growth is projected in the semi- and unskilled white collar, rural workers and armed service categories. This is principally due to the anticipated upgrading of skills in a number of service industries and the continued decline in the importance of the rural sector over the next decade.

When the base scenario assumptions regarding technological change, international trade and employment were modified in Appendix 2, this resulted in only minor changes to the occupational composition of the labour force in 1990-1991, with all occupational categories still experiencing positive growth. Such changes as did occur were most notable under alternative assumptions regarding labour/output ratios. Delaying technological progress resulted in an increased proportion of employment in white collar categories and a diminished proportion in skilled blue collar categories, relative to the base scenario. This reflected relative changes in industry performance.

It follows from the above discussion, that there will be a need, over the next decade, for a gradual upgrading of skills in the workforce if Australia is to be able to exploit the areas of comparative advantage in its industrial structure. However, as this process will be only gradual, overall it is unlikely that severe skill shortages will constrain Australia's economic performance during the next decade. This is not to say that skill shortages will not occur. Regional imbalances in supply and demand will undoubtedly arise. In fact, there may be overall shortages for particular skills for brief periods if the development phases of certain projects overlap. However these are short term problems which should not seriously impede the longer term achievements of the economy. Labour market forces, perhaps assisted by government through schemes to enhance job mobility, should ensure that such imbalances and shortages are of short duration.

7.5 Conclusions

This assessment has interpreted the results of the projections of Chapter 6 in the light of subsequent developments during the 1970s and extraneous factors not directly incorporated in the formal model. The assessment has left a firm impression of the size and probable direction of Australia's industrial development to 1990.

First Australia has the potential for strong economic growth over the next decade. The base scenario projection of an average annual increase in real GDP of 6.2 per cent over the period 1978-1979 to 1990-1991 probably represents an upper limit on the extent of this potential. The evidence presented in section 7.2 suggests that at least the OECD high growth scenario projection of 4.8 per cent average annual increase in real world GDP should be achievable.

The industry growth rates will reflect this strong growth in GDP. All industries, at the input/output level of classification used in this report are likely to have positive growth over the projection period. Some uncertainty surrounds the growth rates of individual industries due to their sensitivity to assumed levels of the technological changes, exports, etc. Some of these considerations suggest a greater uniformity of growth rates. However it is unlikely that the limited variation in industry growth rates projected under the base scenario will be an under-estimate of the realized variation. The economic climate over the next decade may provide opportunities for future Governments to provide positive encouragement for the restructuring of industries in favour of those industries more suited to the basis of Australia's comparative advantage. If so, the fastest growing industries should be those based upon minerals and energy, or those associated with high income elasticity goods and services. The growth rates presented in Chapter 6 for these industries would tend to be low.

Employment will grow in all occupational categories used in this report though more rapidly in the skilled categories. The gradual upgrading of skills that will be necessary is unlikely to require any significant alteration in current educational policies.

Footnotes

1. In a recent study by the Commercial Bank of Australia, it was noted that there has been considerble increase in recent years in undeclared earnings. The study suggests that in 1978-1979 undeclared earnings stood as high as $16.7 billion. As this trend is not recoreded in the national accounts, the actual growth over the period 1971-1972 to 1977-1978 is slightly higher than that used in this report. This means that the estimated growth rate of 6.2 per cent over the period 1977-1978 to 1990-1991 is over-estimated to a small extent.

2. An examination of the impact of mining developments upon the Australian economy is provided in a forthcoming BIE Report, 1981(c).

3. In deriving the input-output table for 1990-1991, adjustments were made to the coefficients to take account of factors such as increasing scale economies. However, these input/output coefficients were not adjusted when the results obtained under the base scenario were tested for their sensitivity to changes in a number of the exogenous variables.

4. This should not be interpreted as implying that industrial disputes are beneficial. Any under utilization of productive resources is wasteful and reduces the overall economic well being of the total community. This statement merely recognizes that in the ill wind of industrial disputes there may be some industries who gain absolutely at the expense of others.

Appendix 1. Analysis of factors contributing to changes in manufacturing employment

The purpose of this appendix is to attempt to quantify the relative importance of the sources of change in manufacturing employment, and draws heavily on work by Marsden and Anderssen. The methodology used by Marsden and Anderssen is based on the approach developed by Krueger (1979) and begins with the following identities.

$$N = RQ \qquad (1)$$

$$C = Q-X+M \qquad (2)$$

where N = number of employees

R = unit labour requirements

Q = domestic output

C = consumption or apparent domestic market demand

X = exports

M = imports

Now apparent market demand can be defined as

$$C = \frac{Q(1-Sx)}{(1-Sm)} \qquad (3)$$

Where Sx = proportion of local demand production exported

Sm = import share of apparent domestic market demand.

Substituting for Q in (1) gives

$$N = \frac{RC(1-Sm)}{(1-Sx)} \qquad (4)$$

Differentiation of (4) with respect to time and dividing by N gives

$$\frac{dn}{dt}\frac{1}{N} = \frac{dR}{dt}\frac{1}{R} + \frac{dc}{dt}\frac{1}{C} - \frac{dSm}{dt}\frac{1}{Sm}\frac{Sm}{1-Sm} + \frac{dSx}{dt}\frac{1}{Sx}\frac{Sx}{1-Sx} \qquad (5)$$

that is

$$n = r + c - sm\frac{Sm}{1-Sm} + sx\frac{Sx}{1-Sx} \qquad (6)$$

where n = rate of growth of employment

r = rate of growth of unit labour requirements

c = rate of growth of consumption (apparent domestic demand)

sm = rate of growth of the import share of apparent domestic market demand

sx = rate of growth of proportion of local production exported

In other words, the rate of growth of employment is equal to the sum of the growth rate of unit labour requirements, the growth rate of apparent domestic demand and the weighted growth rate of the proportion of local production exported minus the weighted growth rate of the import share of apparent domestic market demand.

This methodology can be readily extended to separate the effects on employment of imports from developing Asia and from imports from all other countries.

Defining import shares as

$$Sm = Sa + So \qquad (7)$$

where Sa = the share of domestic market demand held by imports from developing Asia

So = the share of domestic market demand of imports held by all other countries

and substituting (7) into (4) gives

$$N = \frac{RC(1 - (Sa + So))}{1 - Sx} \qquad (8)$$

differentiation of (8) and dividing by N gives

$$n = r + c - sa \frac{Sa}{1-Sm} - \frac{so\ So}{1-Sm} - sx \frac{Sx}{1-Sx}$$

where n = rate of growth of employment

r = rate of growth of unit labour requirements

c = rate of growth of apparent market demand

sa = rate of growth of the share of the domestic market of imports from developing countries

so = rate of growth of the share of domestic demand of imports from all other countries.

Before proceeding with the analysis it is useful to not a number of limitations associated with the methodology described above. First, only the direct or initial employment effects are considered, while the indirect effects operating through multipliers and input-output linkages are ignored. Secondly the method of analysis can only serve to demonstrate the apparent effect of a number of specific factors. The economic identities which form the basis of the following analysis do not take account of the inter-related nature of the separate factors isolated for examination. For example, an increased level of imports is likely to influence the growth of aggregate demand through the pressure of imports on domestic prices. Additional imports also increase the degree of competition and so tend to influence productivity. Similarly, additional exports may increase productivity by enabling producers to achieve economies of scale. In the analysis, the employment change attributed to a particular factor includes the second round effects of some of the other factors induced through these types of relationships. There is no attempt here to decompose the employment changes further to better identify the total influence of the specific factors examined.

In most cases these second round effects are expected to be small. For example, the import share of Australia's domestic market is generally small, and hence the ability of imports to influence aggregate consumption is limited. Other factors such as the domestic cost pressures, changes of tastes and market structure are likely to be of more significance in most cases. However the two qualifications mentioned, the inter-relatedness of factors and the exclusion of indirect effects mean that the values presented in the subsequent tables must be taken as only indicative.

Despite these limitations, several such studies have been carried out for other countries, in an attempt to quantify the relative importance of the sources of change in manufacturing employment. In Australia this approach has been applied by Marsden and Anderssen to constant price data for Australian manufacturing industry at the 2 digit Australian Standard Industrial Classification (ASIC) level for the period 1968-1969 to 1975-1976.

The results obtained for the twelve industry groups are given in Table A1.1. The figures indicate the contribution of each of the different factors to the annual percentage change in employment over the seven year period. For example, between 1968-1969 and 1975-1976, employment in fabricated metal products fell by 0.64 per cent a year. The analysis shows that the expansion in aggregate demand alone would have caused employment to grow by 1.26 per cent a year. However, increased import penetration and a reduction in the proportion of production exported would have caused declines in employment of 0.56 per cent and 0.19 per cent a year, respectively. A fall in unit labour requirements would have been responsible for an annual reduction in employment of 1.14 per cent. The net effect of these factors was the decline of 0.64 per cent a year.

For the manufacturing sector as a whole, the principle reason for the annual fall in employment of 0.51 per cent over the period was improved labour productivity, that is, a fall in unit labour requirements. This effect slightly outweighed the expansion in employment due to the growth in aggregate demand. For all twelve industry groups, the employment effect of increased import penetration was found to be less than the reduction in employment attributable to the fall in unit labour requirements. For most industries the employment effects of changes in the import and export shares were small compared to the effects of other factors. The effects from variations in the trade shares however were sometimes significant compared to the net employment growth.

The textiles and clothing and footwear industries recorded the highest reductions in employment. In the former industry, employment declined at a rate of 4.1 per cent a year and in the latter at 4.4 per cent a year over the period 1968-1969 to 1975-1976. A feature of the change in textile employment was the employment consequences of increased import penetration which contributed 1.25 per cent a year to the fall in employment, that is, one quarter of the overall rate of employment decline. The major impact on textile employment was the increase in labour productivity, which caused employment to decline by 6.1 per cent a year.

In the case of the clothing and footwear industries, the rise in the market share had an even more significant effect on employment growth, but it was still much less than the fall in unit labour requirements.

Finally, changes in the proportion of domestic output that was exported had minimal effects for all industry groups except basic metal products, where the growth in the export propensity caused employment to expand by 1.56 per cent a year over the period.

The period covered in the previous analysis encompasses two quite different stages of the business cycle in Australia. The years 1968-1969 to 1973-1974 were a time of economic expansion, whereas between 1973-1974 and 1975-1976, Australia was experiencing an economic recession. The analysis therefore examined whether the relative contributions of the sources of employment change differed in these two sub-periods. The results are shown in Table A1.2.

For the total manufacturing sector, the decline in employment was 4.6 per cent a year for the period 1973-1974 to 1975-1976 compared with an average increase of 1.1 per cent a year between 1968-1969 and 1973-1974. The predominant factor contributing to this marked difference in employment experience was the change in the rate of growth of domestic demand. In the first period, the increase in apparent domestic demand would, by itself, have led to an expansion of manufacturing employment of 5.3 per cent per year. Between 1973-1974 and 1975-1976, however, the decline in domestic demand would have been responsible for a fall in employment of 2.7 per cent a year.

During this latter period, continuing improvements in labour productivity also contributed to the decline in employment but not at the same rate as in the preceding period of economic expansion. In these years, 1973-1974 to 1975-1976, the change in import shares actually made a small positive contribution to the growth of employment. It is often assumed that this was a period when import penetration increased, following the 25 per cent across-the-board tariff cut in 1973. However, the effect of the quantitative import restrictions introduced in 1974-1975 and the impact of the recession upon the demand for imports of basic metal products appears to have offset any adverse effects of the tariff reduction on manufacturing employment overall.

Considering the individual industry groups within the manufacturing sector, Table A1.2 shows that in the period 1973-1974 to 1975-1976 a decline in domestic demand had a negative impact on employment in nine of the twelve industry groups. Only in the case of food, beverages and tobacco, other machinery and equipment and miscellaneous manufacturing did demand changes contribute to an increase in employment in this period. An increase in the market share of imports had a significant adverse impact on employment in four industries, namely, clothing and footwear, fabricated metal products, other machinery and equipment and miscellaneous manufacturing. By contrast, a reduction in import penetration for textiles and transport equipment, caused employment to expand by around 2.3 per cent a year in both cases. The extent of the employment growth due to a reduced share of imports was also important in basic metal products, chemical, petroleum and coal products and wood, wood products and furniture.

On the export side, the basic metal products, textiles and other machinery and equipment industries increased the share of their domestic production going to export markets during the years 1973-1974 to 1975-1976. This contributed 2.2 per cent, 0.8 per cent and 0.7 per cent respectively to the annual growth of employment in these industries. In the case of transport equipment the export share declined significantly in this period and was responsible for a loss of employment in that industry of almost 1.9 per cent a year.

From several points of view, the period from 1973-1974 to 1975-1976 does not necessarily provide a reliable guide to the longer-term influence of international trade flows upon employment in Australian manufacturing industries. First, the period is very brief, only two years, and the short-term effects of the recession are strongly evident. Secondly, imports of manufactured goods were affected by the 25 per cent tariff cut, exchange rate adjustments and subsequently by the introduction of quantitative restrictions for certain industries. Thus, it is probably more

useful to examine the experience between 1968-1969 and 1973-1974 to determine the long-term effect of trade pressures upon the structure of Australian industry. An analysis of the earlier period revealed several features common to most industries. As with the full period analysis, the principal determinants of the industry employment growth were the growth rates for productivity and the domestic market demand. The employment effects induced by international trade changes were generally small compared to the changes caused by those factors. Furthermore the import and export effects were frequently offsetting. This means that product differentiation within the broad industry categories permitted industries to simultaneously increase (decrease) their exports and imports.

Table A1.3 examines the employment changes associated specifically with imports from developing Asian countries for the period 1968-1969 to 1975-1976. The overall impact on employment of such imports was negligible due to the small share of imports from Asia in total imports and the small effect of changes in the total import share. In the textiles, clothing and footwear, and wood, wood products and furniture industries, imports from Asia did make up a significant proportion of total imports, and the import share effect on the changes of employment growth reflect this relative importance. For example, the estimated employment change due to the growth in the market share of textiles and clothing and footwear from the developing Asia region was about 0.7 and 1.7 per cent per year, respectively. For the miscellaneous manufacturing industry the employment reduction associated with changes in the market share of Asian imports is significant because of strong growth in the Asian share of imports.

The effects on employment growth of exports to developing Asia have also been estimated, and are presented in Table A1.4. Probably two main findings can be distinguished. First, the share of exports going to Asia in the majority of industries increased during the period 1968-1969 to 1975-1976. Secondly, the employment growth associated with the rising proportion exported to Asian countries has been small. There are however two notable exceptions to the general finding of an increase in the share of exports to Asia. Both the wood, wood products and furniture industry and the paper, paper products and printing industry significantly reduced their share of exports from 12.9 per cent to 1.7 per cent and 31.4 per cent to 17.8 per cent respectively. Not surprisingly, the employment growth associated with these changes was negative, albeit small, amounting to only -0.01 per cent per annum and -0.03 per cent per annum respectively. These small employment losses, despite such changes in the export share attributable to the developing Asia region, are due to the relative unimportance of total exports to production in these industries.

Two further specific results can be highlighted. First, the employment growth associated with the proportion exported to Asia in the food, beverages and tobacco industry has been the greatest, showing an increase of 0.36 per cent per annum. Secondly, while the share of exports to Asia in basic metal products has remained fairly stable, there was an increase in the proportion of output exported in the same period. Hence the growth rate of employment in this industry has been above average.

One shortcoming of all the above analysis is that all imports are assumed to be perfect substitutes with domestic production. This assumption however, would not be appropriate for most industries. In 1975-1976, for example, 56 per cent of Australia's imports of manufactures entered duty free. A number of calculations were conducted to gauge the extent of the bias introduced by this assumption. Due to the difficulties with the data these calculations were necessarily rough and are not reported here. However, all the calculations produced the expected result that the previous analysis tends to overestimate the impact on employment of changes in the level of import penetration and reinforces the previously drawn conclusion that by far the most important influence on the growth of employment has been changes in the growth of aggregate demand in the economy and changes in unit labour requirements.

Table A1.1 : Employment changes in Australian manufacturing industries associated with specific sources, 1968-69 to 1975-76 (per cent per annum)

Industry	Contribution to average[a] employment growth associated with the change in :					Observed average employment growth	Employment growth expected if the market share was fixed for :	
	Demand	Import share of domestic demand	Proportion of output exported	Output	Unit labour requirements		Imports and exports	Imports
	1	2	3	4	5	6	7	8
Food beverages and tobacco	3.48	-0.13	0.79	4.14	-3.00	1.14	0.48	1.27
Textiles	3.55	-1.25	-0.26	2.03	-6.05	-4.10	-2.50	-2.76
Clothing and footwear	2.85	-2.59	-0.04	0.23	-4.60	-4.37	-1.75	-1.79
Wood, wood products and furniture	2.01	-0.54	0.31	1.78	-1.86	-0.07	0.16	0.47
Paper, and paper products, printing	3.14	0.08	-0.02	3.20	-3.42	-0.22	-0.28	-0.29
Chemical, petroleum and coal products	3.05	0.88	0.69	4.61	-5.29	-0.68	-2.25	-1.56
Non-metallic mineral products	3.37	0.02	0.02	3.40	-3.98	-0.58	-0.61	-0.59
Basic metal products	1.86	0.38	1.56	3.79	-2.87	0.92	-1.02	0.54
Fabricated metal products	1.26	-0.56	-0.19	0.51	-1.14	-0.64	0.12	-0.08
Transport equipment	1.48	0.01	0.10	1.58	-1.72	-0.14	-0.24	-0.14
Other machinery and equipment	3.86	-2.08	0.49	2.27	-2.81	-0.54	1.05	1.54
Miscellaneous manufacturing	6.10	-0.97	-0.07	5.06	-4.32	0.74	1.79	1.71
All manufacturing	3.02	-0.67	0.45	2.85	-3.36	-0.51	-0.34	0.12

Source : Marsden and Anderssen (1979).

Note :

(a) Calculated as $(\ln V_t - \ln V_o)/t$ where t is the number of years between initial value V_o and final value V_t.

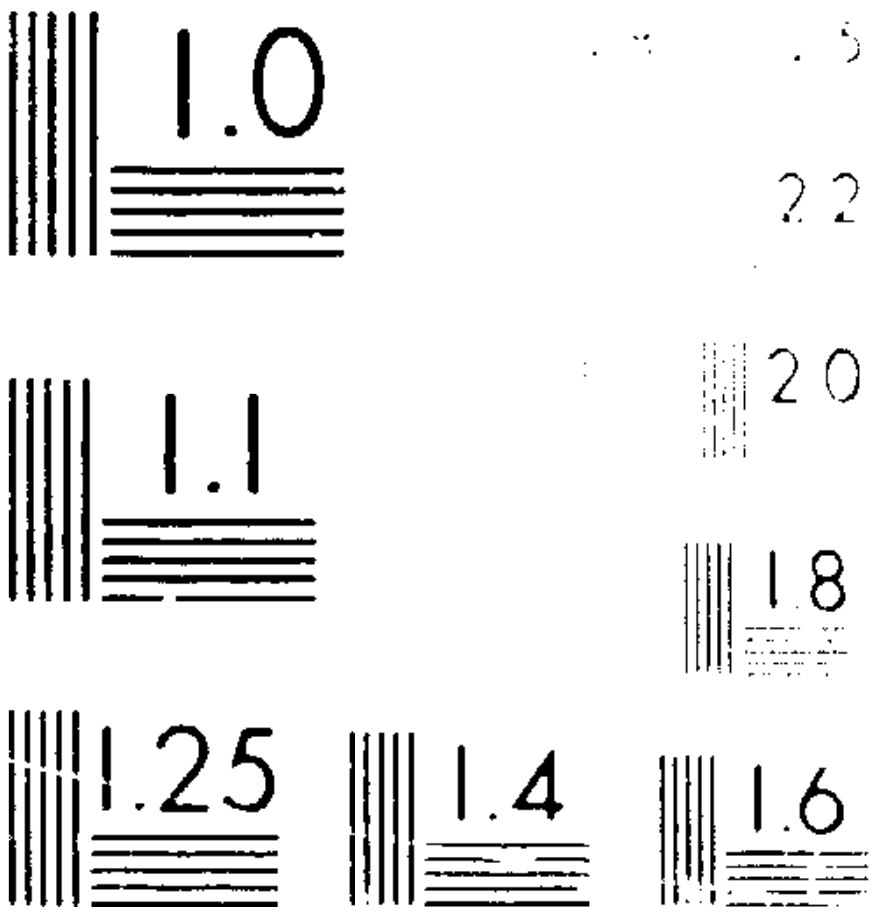

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2

Table A1,2 : Employment changes associated with specified sources in expansion[a] (1968-69 to 1973-74) and recession[b] (1973-74 to 1975-76) (per cent per year)

Industry description		Average[c] employment growth associated with changes in :					Observed employment growth	Employment growth if market shares were fixed for :	
		Demand	Market share of imports	Proportion of output exported	Output	Unit labour requirements		Exports and imports	Imports
		1	2	3	4	5	6	7	8
Food, beverages and tobacco	E	3.59	-.34	1.20	4.45	-2.45	1.99	1.13	2.33
	R	3.20	0.40	-0.24	3.37	-4.36	-0.99	-1.16	-1.40
Textiles	E	8.18	-2.66	-0.70	5.02	-6.45	-1.44	1.92	1.23
	R	-8.53	2.27	0.84	-5.42	-5.03	-10.45	-13.55	-12.73
Clothing and footwear	E	5.05	-2.39	-0.01	2.66	-4.75	-2.10	0.30	0.29
	R	-2.6[illegible]	-3.09	-0.11	-5.85	-4.22	-10.07	-6.87	-6.98
Wood, wood products and furniture	E	4.48	-1.20	0.54	3.83	-3.21	0.62	1.27	1.82
	R	-4.16	1.10	-0.26	-3.33	1.53	-1.80	-2.63	-2.89
Paper and paper products	E	5.31	0.17	0.06	5.54	-4.30	1.23	1.01	1.07
	R	-2.29	-0.15	-0.21	-2.65	-1.21	-3.86	-3.50	-3.70
Chemical, petroleum and coal products	E	5.96	0.52	1.04	7.53	-6.51	1.02	-0.54	0.50
	R	-4.25	1.77	-0.19	-2.68	-2.27	-4.95	-6.52	-6.72
Non metallic mineral products	E	6.46	-0.29	0.04	6.21	-4.53	1.63	1.88	1.92
	R	-4.36	.78	-0.03	-3.61	-2.49	-6.10	-6.86	-6.88
Basic metal products	E	5.51	-0.56	1.31	6.27	-4.14	2.13	1.38	2.69
	R	-7.28	2.71	2.18	-2.40	0.28	-2.11	-7.00	-4.82
Fabricated metal products	E	3.99	-0.08	-0.21	3.70	-2.62	1.08	1.37	1.16
	R	-5.58	-1.76	-0.14	-7.48	2.55	-4.92	-3.02	-3.16
Transport equipment	E	3.75	-0.93	0.89	3.71	-1.82	1.90	1.94	2.83
	R	-4.22	2.35	-1.88	-3.75	-1.47	-5.22	-5.69	-7.58
Other machinery and equipment	E	5.06	-1.46	0.42	4.03	-2.89	1.14	2.17	2.60
	R	0.85	-3.63	0.65	-2.13	-2.62	-4.75	-1.77	-1.11
Miscellaneous manufacturing	E	8.40	-0.44	0.08	8.04	-4.42	3.62	3.99	4.07
	R	0.35	-2.30	-0.45	-2.40	-4.07	-6.47	-3.72	-4.17
All manufacturing	E	5.29	-0.93	0.61	4.97	-3.82	1.14	1.46	2.08
	R	-2.65	0.15	0.06	-2.44	-2.19	-4.63	-4.84	-4.79

Source : As for Table A1.1.

Notes: (a) Results for the expansionary period are in rows marked E. (b) Results for the period of recession are in rows marked R

(b) Calculate as $(\ln V_t - \ln V_o)/t$ where t is the number of years between initial value V_o and final value V_t. For small growth rates these averages closely approximate those calculated conventially from $(V_t/V_o)^{1/t} - 1$.

Table A1.3. Employment changes in Australian manufacturing industries associated with imports from developing Asia, 1968-69 to 1975-76

	Asian share (b) of imports		Import share of demand (c)		Observed employment growth	Employment growth associated with changes in:		
						Market share of Asian imports (d)	Market share of other imports (e)	Market share of all imports (f)
	1968-69	1975-76	68-69	75-76				
	%	%	%	%	% p.a.	% p.a.	% p.a.	% p.a.
Food, beverages and tobacco	7.8	15.6	4.8	5.6	1.14	-0.08	-0.05	-0.13
Textiles	20.0	25.8	32.7	38.3	-4.01	-0.74	-0.51	-1.25
Clothing and footwear	32.8	57.2	7.3	22.7	-4.37	-1.69	-0.90	-2.59
Wood, wood products and furniture	22.8	42.6	8.1	11.5	-0.07	-0.48	-0.06	-0.54
Paper and paper products, printing	2.7	6.7	17.0	15.3	-0.22	-0.10	0.38	0.28
Chemical, petroleum and coal products	4.3	11.9	24.7	20.0	-0.68	-0.25	1.13	0.88
Non-metallic mineral products	3.4	5.1	9.0	10.1	-0.58	-0.03	-0.15	-0.18
Basic metal products	1.5	3.1	7.6	5.9	0.92	-0.01	0.27	0.26
Fabricated metal products	2.3	9.5	8.6	11.2	-0.64	-0.15	-0.26	-0.41
Transport equipment	0.0	1.0	28.4	28.3	-0.14	-0.05	0.06	0.01
Other machinery and equipment	0.5	2.7	32.7	42.8	-0.54	-0.21	-2.11	-2.32
Miscellaneous manufacturing	6.9	16.5	20.7	25.9	0.74	-0.52	-0.45	-0.97
All manufacturing	4.6	10.3	17.5	21.0	-0.51	-0.24	-0.38	-0.62

Source: As for Table A1.1, and Bureau of Industry Economics (1978).

(a) Developing Asia includes Malaysia, Indonesia, Philippines, Singapore, Thailand, Hong Kong, Republic of Korea, Island of Taiwan, China and India.
(b) These shares are measured in current prices.
(c) These shares are measured at constant 1968-69 prices.
(d) Calculated as the growth rate of the market share of Asian imports weighted by the average Asian share of imports and the average market share of imports.
(e) Calculated as the employment growth associated with changes in the market share of imports minus that for the market share of Asian imports.
(f) Calculated as $(\ln V_t - \ln V_0)/t$ where t is the number of years between initial value V_0 and final value V_t, and V equals one minus the import share of demand.

Table A1.4 : Employment Changes associated with Exports to Developing Asia[a], 1968-69 to 1975-76.

Industry description	Asian share of exports[b]		Proportion of output exported		Observed employment growth	Employment growth associated with changes in proportion exported to[c]		
	1968-69	1975-76	1968-69	1975-76		Asian countries	Other countries	All countries[d]
	%	%	%	%	% p.a.	% p.a.	% p.a.	% p.a.
Food, beverages and tobacco	9.5	16.3	19.2	23.5	1.14	0.36	.43	- .79
Textiles	19.3	16.7	13.7	12.2	-1.01	-0.11	-0.15	-0.26
Clothing and footwear	17.2	20.2	1.0	0.7	-4.37	.00	-0.03	-0.03
Wood, wood products and furniture	12.9	1.7	1.1	3.2	-0.07	-0.01	0.33	0.32
Paper and paper products printing	31.4	17.8	1.3	1.2	-0.22	-0.03	0.01	-0.02
Chemical, petroleum and coal products	22.0	19.9	5.7	10.1	-0.68	0.12	0.56	0.68
Non metallic mineral products	14.1	37.1	0.8	1.0	-0.58	0.03	-0.01	0.02
Basic metal products	15.9	15.5	21.6	29.7	0.92	0.23	1.33	1.56
Fabricated metal prods.	12.1	25.6	4.0	2.[illegible]	-0.64	0.03	-0.22	-0.19
Transport equipment	19.7	29.3	4.1	4.8	-0.14	0.09	0.00	0.09
Other machinery and equipment	23.3	26.8	4.8	8.0	-0.54	0.16	0.33	0.49
Miscellaneous manuf.	16.7	22.6	4.2	3.7	0.74	0.02	-0.09	-0.07
All manufacturing	14.6	17.3	9.6	12.5	-0.51	0.12	0.33	0.45

Source : Marsden and Andersson (1979).

Notes : (a) Developing Asia includes Hong Kong, Republic of Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, China and India.
(b) These shares are measured in current prices.
(c) These shares are measured at constant 1968-69 prices.
(d) Calculated as $(\ln - \ln V_o)/t$ where t is the number of years between initial value V_o and final value V_t.

Appendix 2. Implications for the Future Industrial Structure of Changes in the Underlying Assumptions

1. Introduction

In Chapter 6 it was pointed out that the results obtained using our best estimates of the variables exogenous to SNAPSHOT were subject to a number of inherent difficulties, and consequently there is a need to establish the robustness of the results presented to variations in the basic assumptions underlying the exogenous predictions. By varying the exogenous projections of certain key variables it is also possible to provide some indication of the likely effects on Australia's future industrial structure of a number of possible developments in the Australian and world economies. These developments include: different government policies regarding industry assistance; growth in world trade; and the domestic reaction to short run disruptions associated with technological change. All of these themes are addressed in this appendix.

With regard to the need to establish the robustness of the results, it should be emphasized that many of the assumptions implicit in SNAPSHOT are not amenable to standard sensitivity testing. One problem centres around the large number of exogenous variables that must be specified. This necessitates a 'best guess' approach to many of the economic variables needed for any particular SNAPSHOT year. Perhaps the greatest shortcoming is that SNAPSHOT, in common with most linear programming models, has serious limitations in its handling of price responses and substitution possibilities.

Although it is important to be wary of these shortcomings, the ability of the model to provide an accurate picture of the economy at an industry level has been established through previous experiments.[1/] The aim of these was to determine how accurately the model could reproduce the 1971-1972 key economic aggregates and the industry vectors of household consumption, investment, industry growth rates, and labour demands by occupation, given initial conditions in 1962-1963 and given the production, technology, demographic and trade scenarios for the year 1971-1972. The results for the macro-economy are set out in Table A2.1. These show that SNAPSHOT was able to predict the 1971-1972 macro-economic variables with a striking degree of accuracy, with no single variable differing more than ±7.6 per cent in error from the actual data. At the detailed industry level, the validation experiments also confirmed the model's ability to give a very accurate reproduction of industry-by-industry projections of output, consumption and investment.[2/]

These validation experiments, then, have demonstrated the model's ability to give an accurate forecast of industry variables given an accurate set of exogenous variables and provide testimony to the internal consistency of the model. It remains, however, to be seen how sensitive the 1990-1991 results are to alternative sets of exogenous projections.

In the next section, changes to the technology scenario will be introduced, via different assumptions regarding labour productivity. Section 3 will address changes in the international trade scenario using different assumptions regarding the level of exports. In Section 4, the demographic scenario is tested for sensitivity by varying the level of employment assumed for 1990. Finally, Section 5 summarizes the findings of the Appendix.

2. Changes in the technology scenario[3]

Technological change is currently the subject of much debate in Australia. This debate has raised two distinct but related issues. One is concerned with the uncertainty of the consequences of technological change on the overall level of unemployment in both the long and short run. The other is whether the effect of technological change in terms of decreased employment and loss of skills in certain industries provides sufficient justification for delaying the rate of technlogical change in these industries. These issues have been the subject of a recently published Government inquiry under Sir Rupert Myers.[4]

The purpose of this section is to assess the implications for Australia's industrial structure in 1990-1991 of any deliberate moves to delay or increase the rate of technological change over the next decade. The discussion provides an indication of the robustness of the base scenario results to modifications in the basic technology scenario. It should be noted that the analysis abstracts from the question of the effect of technological change on the level of unemployment, as this is an exogenous input into SNAPSHOT.

In Chapter 6 it was argued that technological change can be fairly well represented in an economic framework by appropriate changes in labour productivity. The approach adopted in this section relies on this observation. For example, when changes are made in the technology scenario for 1990-1991 to reflect the delayed adoption of new technology, these changes are achieved by modifying the labour coefficients matrix only. It is useful to recall that, in deriving the base scenario, trade was largely an exogenous input into SNAPSHOT. However it is clear that differing rates of technological change will have implications for the competitiveness of Australian industries. Hence, it was thought to introduce some modifications to the SNAPSHOT model which effectively endogenize trade for the purpose of these sensitivity tests.[5]

This section examines the effects of the three following changes to the base scenario. Scenario 2 explores the influence on the industrial structure in 1990-1991 of a faster rate of technological change in the period up to the SNAPSHOT year. Accordingly, this scenario assumes an across-the-board 10 per cent reduction in the labour to output ratio in 1990-1991 compared with the base scenario. Scenario 3 explores the influence on the industrial structure in 1990-1991 of a slower rate of technological change in the period up to the SNAPSHOT year. Accordingly, this scenario assumes an across-the-board 10 per cent increase in the labour to output ratio in 1990-1991 compared with the base scenario. In both these scenarios it is assumed that any change in labour productivity in Australia does not also occur in the rest of the world.

The primary concern of this approach is with the differences between the base scenario projections and the projections obtained under the modified scenarios. The choice of a 10 per cent change in the level of the labour to output ratio is intended to be solely illustrative of the types of changes to the base scenario brought about by possible errors in the forecast changes in technology and does not represent an indication of the size of the expected possible error.

Table A2.2 highlights some of the more important macro-economic indicators projected to 1990-1991, under the two alternative scenarios listed above. For comparison, the base scenario projections are repeated as are the actual 1971-1972 data.

Increasing the labour/output ratio by 10 per cent resulted in a substantial decline in the projected level of GDP. The model projects a growth of real GDP of 4.6 per cent per annum when the labour/output ratio is increased by 10 per cent, compared to 5.2 per cent for the base scenario (and 5.5 per cent in the period 1962-1963 to 1971-1972). On the other hand, when the labour/output ratio was decreased by 10 per cent, the anticipated growth in real GDP rises to 5.8 per cent per annum.

Compared to the base scenario, investment is projected to grow at lower rates when technical progress is delayed and at faster rates when technical progress is increased. The average annual rate of growth of gross investment is 5.2 per cent under scenario 2, and 3.8 per cent under scenario 3. This compares with 4.5 per cent under the base scenario and 6.9 per cent for the period 1962-1963 to 1971-1972. Compared to the base scenario, investment rose by 14.5 per cent under Scenario 2 and fell by 12.3 per cent under scenario 3. An investment/GDP ratio of 22.9 per cent was obtained under the base scenario. This rose to 23.5 per cent under scenario 2, and fell to 22.3 per cent under scenario 3. These results reflect the fact that when the growth in labour productivity is less, the profitability of new investment is lower and consequently the rate of capital accumulation is reduced.

Consumption, real wages, GDP per worker, per capita GDP and per capita consumption all vary inversely with the changes in the labour/output ratio. These macro-economic indicators all rose by 11 per cent or more compared to the base scenario when the labour/output ratio was reduced by 10 per cent. They fell by a similar proportion when the labour/output ratio was increased by 10 per cent. In other words, a slower rate of technical progress implies a reduction in living standards compared with the base scenario, and vice versa for a faster rate of technical progress.

Tables A2.3 and A2.4 highlight the thirty most important changes in the proportionate differences of industry growth rates, listed in declining order and categorized according to trade orientation, under scenarios 2 and 3 respectively. From these tables the inter-industry effects of alternative rates of technological change can be gauged by comparing the differential growth performance of industries across to the various scenarios.

From Tables A2.3 and A2.4 it can be seen that relative to the base scenario, those industries that are most affected by changes in the labour/output ratio are predominantly import-competing manufacturing industries, though a number of export industries and service industries also appear in the list. The import-competing industries that are most affected are those that are relatively intense in their use of labour, that is, have a high labour/output ratio. It follows then that such industries lose (gain) most from increases (decreases) in this ratio. Turning to those exporting industries appearing in Tables A2.3 and A2.4, a number of characteristics of these industries determine why they are significantly affected by changes in labour/output ratios. Growth in output in both basic iron and steel and water transport, because of strong linkages with the rest of the economy, is heavily influenced by the general level of economic activity, which in turn is highly sensitive to changes in labour productivity. In addition, basic iron and steel, although an exporting industry, is relatively labour intensive and is therefore sensitive to changes in the labour/output ratio. This also provides a major reason why the flour, cereal, confectionery, wholesale trade, banks, finance, insurance, retail trade, and property and business service industries are sensitive to changes in labour productivity. For sheep and cereal grains, food products n.e.c., milk products, and other metallic minerals, significant changes in growth in output arise because these industries are assumed to have high export price elasticities of demand and export large proportions of their domestic production. This result in the exports of these industries, and hence domestic production, declining (increasing) markedly under scenario 3 (scenario 2) in response to only a relatively small price increase (decrease) arising out of a reduction (increase) in the assumed rate of technological progress.

It is also worth pointing out that the decrease (increase) in labour/output ratios, through its effects on price in Australia relative to overseas, results in an increase (decrease) in exports and consequently imports relative to the base scenario. However, it is also obvious from Table A2.2 that the associated increase (decrease) in GDP is disproportionately large. As a consequence of this disproportionate change in GDP, and thus the increase (decrease) in the size of the domestic market, import shares in many of the import-competing industries actually fall (rise), when productivity is increased (decreased).

Although the size of the workforce in any given SNAPSHOT year is specified exogenously, its occupational composition is endogenous to the model and demand determined. Projections of changes in the occupational structure of the workforce between 1971-1972 and 1990-1991 for the nine occupational groups used in SNAPSHOT are reported in Table A2.6. The most obvious feature of these results is that only minor changes in the occupational structure are projected under all the scenarios considered. It is also noteworthy that when technical progress is delayed, employment in all white collar categories is greater. This is mainly because the industry groups in which these occupations bulk large (Public administration, community services, and Banks, finance, insurance, etc.) are forecast to increase their share of GDP under delayed technical advance. The major decreases occur in the skilled blue collar categories. This reflects the fact that the building industries, which are intensive in the use of skilled labour, are among the industries most affected by reductions in the rate of technical advance. In the case of scenario 2, where there was an across-the-board increase in technical progress, the obverse of the above changes occur.6/

3. Trade scenario

In this section the sensitivity of the results presented in Chapter 6 to changes in the international trade scenario are examined. This is necessarily a rather arbitrary process as, for the purpose of the trade scenario, exports are exogenously determined in SNAPSHOT. The sensitivity tests are accomplished by making changes to the exogenous trade inputs used in the base scenario, while holding all other inputs used in this base scenario constant.

In the base scenario it was assumed that while exports increased at an average annual rate of 3.9 per cent, import penetration in each industry was initially held at their 1974-1975 levels. These import shares were then adjusted to ensure that a balance of trade existed in 1990-1991. This resulted in the projected import shares being only slightly different from the actual 1974-1975 levels. One possible interpretation of this result is that the base scenario was based on a rather conservative forecast of Government progress in reducing protection to Australian industry. As has already been noted earlier the Government has stated its long term objective of reducing tariff levels once economic circumstances permit. Some progress in this direction can be expected over the next decade, and this would result in an increase in both the overall level of exports and the level of import shares in 1990-1991. This effect can therefore be modelled by assuming a percentage across the board increase in exports. For the purpose of illustration, exports were increased by 20 per cent across the board.7/ The resulting scenario is referred to as scenario 4.

The base scenario was founded on a neutral assessment of the Government's attitude to encouraging exports. As noted previously in the report, the Government is aware of the need to encourage the development of a more export oriented manufacturing sector. It is possible that this awareness may be translated into increased assistance to manufactured exports sometime during the 1980s.8/ To examine the effect that such a development would have on the structure of Australian industry, scenario 5 assumes that exports of manufactured goods only are increased by 20 per cent.

The effects of these changes to the base scenario, on the aggregate macro variables are given in Table A2.6. The most striking feature of this Table is that alteration to the assumptions made in the base scenario regarding trade variables has, in both cases, only a limited effect on the macro results obtained in the base scenario. In Scenarios 4 and 5, GDP, in constant 1971-1972 prices, is projected to remain stationary and decline respectively, relative to the base scenario. This can be explained by the fact that over the period 1971-1972 to 1990-1991 the price of exports is projected to increase relative to the price of imports, thus balance of trade is achieved in 1990-1991 prices as a result of an improvement in the terms of trade rather than by an increase in the volume of exports relative to imports. In 1990-1991 prices, as balance of trade is achieved there is a small increase in the projected level of GDP. This increase reflects the improvement of the allocation of resources within Australia. This improvement is under-estimated to some extent as the resultant increases in imports are spread over all industries rather than being concentrated in those industries that are least competitive internationally.

Turning to the other variables presented in Table A2.6, it can be seen that with regard to the major endogenous components of GDP, namely consumption and investment, both increase slightly in scenarios 4 and 5. Given the population and workforce numbers are held constant in both these scenarios, these movements in GDP and consumption are mirrored in the GDP/worker, GDP/person and the Consumption/person statistics.

The inter-industry effects of alternative assumptions regarding international trade are gauged by comparing differential growth performances of industries according to the various scenarios. The results for the thirty most affected industries in each scenario are presented in Tables A2.7 and A2.8.

Table A2.7 gives the results under scenario 4 when exports are increased by 20 per cent across the board. From this table it can be seen that those industries that gain most from the increase in exports are, not unexpectedly, predominantly export industries. Non-export industries that also make substantial gains in this scenario are the services to agriculture and services to mining industries. This is due principally to their high input into the agricultural and mining sectors, which are the major beneficiaries of an increase in exports.

As a balance of trade is assumed in 1990-1991, the increase in exports must be met by matching increase in imports, and consequently Table A2.7 shows that the industry growth rates of many of the import-competing industries fall relative to the base scenario. The import-competing industries that undergo the greatest decline are typically those with high levels of import penetration in the base scenario. The appearance of basic iron and steel (classified as an exporting industry), is due principally to the fact that this industry is also subject to some import competition.

When the increase in exports is limited to the manufacturing industries, it can be seen from Table A2.7 and A2.8 that thirteen of the fifteen industries with the greatest decline in their production are common to both scenarios, though the ranking of those industries undergoes some change. All of the fifteen industries worst affected by the assumed increase in manufactured exports (scenario 5) are import-competing industries. These industries do not stand to gain much from a 20 per cent increase in their exports, and are adversely affected by the increase in the total level of imports.

More dramatic changes occur in the ranking of the fifteen industries that gain most from the 20 per cent increase in the level of manufactured exports. Although twelve of the fifteen industries identified in Table A2.8 as being the fifteen most positively affected under scenario 5, once again appear in the corresponding list in Table A2.7, significant changes in the rankings of industries occur. The industries which improve their relative position under scenario 5 are those manufacturing industries involved in the processing of agricultural products and to a lesser extent mining products. Electricity also experiences some relative gain due to its strong linkages with the manufacturing sector.

Moving from the effects on industry performance to the effects on workforce composition, the most obvious conclusion to be drawn from Table A2.9 is that the results obtained in the base scenario are virtually unaffected by the changes to the assumptions made regarding international trade. The only significant change being the increase in the proportion of rural workers to the total workforce when exports are increased by 20 per cent across-the-board, reflecting the importance of exports of rural based commodities.

4. The labour market

The total workforce in any SNAPSHOT year is specified exogenously and is based on assumptions regarding the projected population, workforce participation rates and the level of unemployment. This allows SNAPSHOT, under the implicit assumption that labour is perfectly mobile across industries and regions over the time period being considered, to project a particular industry structure and workforce composition at different specified levels of unemployment. This section will examine the sensitivity of the results presented in the base scenario to changes in the assumed level of unemployment while holding the base scenario assumptions regarding participation rates and population constant in all scenarios.

Full employment is often assumed in general equilibrium models, and the implications of this are tested in scenario 6. On the other hand, some pessimistic observers feel that the likelihood of reductions in current high levels of unemployment over the next ten years is slight. The results of such a situation are tested in scenario 7, which assumes an unemployment level of 6 per cent, which is only a slight improvement over current unemployment levels. The implications of these changes for macro-economic indicators are presented in Table A2.10.

The use of scenario 6, which assumes full employment, causes consumption to rise by $3.1 billion to $67.8 billion, investment to rise by $1.2 billion to $23.2 billion, and GDP to rise by $4.1 billion to $100.3 billion. As unemployment is increased from 4 per cent in the base scenario to 6 per cent in scenario 7, the macro-economic indicators reflect the reduced level of economic activity and consumption falls by $1.5 billion to $63.2 billion, investment falls by $0.7 billion to $21.3 billion, and GDP falls by $2.4 billion to $93.8 billion.

Since population numbers are held constant over the three scenarios, these trends in the levels of consumption and GDP will also occur in levels of GDP per person and consumption per person. This, however, is not the case for GDP per worker or the average wage, as the size of the workforce increases from 7.75 million in scenario 1 to 8.07 million in scenario 6, and falls to 7.59 million in scenario 7. Both GDP per worker and the average wage remain roughly constant over the three scenarios presented.

The industry-by-industry results are outlined in Table A2.11 and A2.12 which details the thirty industries whose domestic production growth rates relative to those occurring under the base scenario are most affected by the changes in employment levels assumed in scenarios 6 and 7. Import-competing, labour intensive industries benefit most from a greater use of available labour resources and lose most when employment is reduced.

In addition, increased economic activity boosts the growth of basic iron and steel and certain service industries such as wholesale and retail trade, banks finance and insurance, water transport and property and business services. While changes in levels of employment do affect relative industry performance, changes in growth rates are by no means dramatic - the most substantial being only 14.8 per cent.

Table A2.13 deals with the composition of the workforce under scenarios 1, 6 and 7. This table reveals that changes in the total level of employment create only minor changes in composition relative to the base scenario. Growth rates for all categories except the armed forces, which is exogenous, increase when full employment is assumed, and decrease when the unemployment level is increased to 6 per cent. Although there is some variation in these growth rates, such changes are small and result in only minor variations in the percentage contribution to total employment for each of the nine categories of the labour force. This result indicates that the base scenario results relating to the percentage contribution of each occupation to total employment are largely unresponsive to changes in the assumed level of employment. The absence of large differences in the percentage contribution to total employment under scenarios 6 and 7 can also be partly explained by the level of disaggregation of the workforce into only nine categories.

5. Conclusions

This appendix has analyzed the responses of SNAPSHOT to changes in the technology, trade and demographic scenarios used in Chapter 5. The primary aim of this exercise was to establish the robustness of the base scenario results. In addition the results were used to gain some indication of the likely effects of Australia's future industrial structure of a number of possible developments in the Australian and world economies.

The introduction of alternative assumptions regarding the rate of technological change showed that the major macro-economic indicators, viz., GDP and its components, and indicators of material well-being, all vary directly with the rate of technological change, and the changes in these indicators were found to be quite significant. On an industry-by-industry basis, it was shown that delaying technological progress will have most effect on import-competing industries and labour intensive services and exporting industries. In contrast to the macro-economic and industry results, changes in the assumptions regarding the rate of technological change had only a limited effect on the composition of the workforce, but did broadly reflect the relative gains and losses evident in the industry results.

In Section 3, several modifications were made to the export levels employed in the base scenario. These changes had little effect on the macro-economic and composition of the workforce results, but did have an effect on the industry results. When exports were increased by 20 per cent across-the-board, the export oriented agricultural and mining industries increased their level of production most, while import-competing manufacturing industries decreased their level of production. In scenario 6 where the level of manufactured exports only was increased by 20 per cent, little change was obvious in the industries most negatively affected, though manufacturing industries involved in the processing and export of agricultural and mining products tended to improve their relative position.

The introduction of alternative assumptions regarding the level of unemployment had a predictable effect on the macro-economic results presented in the base scenario, with a reduction in the level of unemployment leading to an almost proportional increase in the level of GDP, and vice versa for an increase in the level of unemployment. This picture also emerged when changes to the occupational composition of the workforce were examined, though virtually no change was recorded in the relative importance of the different occupation groups in total employment. In relation to the industry results, it was noted the industries most affected were the labour intensive, import-competing industries, and certain manufacturing and service industries responsive to the overall level of economic activity.

Footnotes

1. Dixon, P.B., Harrower, J.D., and Vincent, D.P., 'Validation of the SNAPSHOT Model', IMPACT of Demographic Change on Industry in Australia, Preliminary Working Paper No. SP-12, Melbourne, July 1979.

2. For details of the results of the validation experiment on industry outputs see Tables 6, 7, 9, 10, 11, 12, 13 and 14 of the above paper.

3. A more detailed examination of the economic effects of different assumed rates of technological change is contained in, Bureau of Industry Economics, The Long-Run Impact of Technological Changes on the Structure of Australian Industry to 1990-91, Research Report, AGPS, Canberra, 1981.

4. Committee of Inquiry into Technological Change in Australia (1980).

5. These modifications are fully described in Chapman, D., 'Endogenising Trade in the SNAPSHOT Model', Bureau of Industry Economics, Forthcoming Working Paper.

6. The large changes in numbers employed in the armed services is a result of the fact that Government expenditure is exogenous to the model and that employment in the armed forces is a constant proportion of this expenditure. Consequently a 10 per cent increase (decrease) in the labour/output ratio in the armed services, results in a 10 per cent increase (decrease) in employment in the armed services.

7. It is recognized that the export sector may have been under-estimated for a number of reasons including an increase in export subsidies. However, export subsidies are likely to be most significant in those manufacturing industries which are expanding exports from a small base and so would be of lesser importance to major exporting industries. Furthermore, the export scenario does not appear to be unduly affected relative to the other exogenous inputs used in the base scenario.

8. The Study Group on Structural Adjustment - Report, AGPS, Canberra, 1979, recommends that export incentives to manufacturing industries be increased. The Government, however, felt that because of budgetary restraint and because outlays under the major export incentive schemes have expanded in recent years, it was not currently appropriate to implement the recommendation.

Table A2.1 : Comparison of projected and realised values for macro-economic indicators, 1971-72.

	SNAPSHOT Projection ($m 1971-72)	Actual ($m 1971-72)
Consumption (basic values)	21053	20858
Net taxes on consumption	1404	1361
Private investment (basic values)	9194	9355
Net taxes on investment	73	79
Government expenditure	4942 (exogenous)	4942
Exports (basic values)	5429 (exogenous)	5429
Net taxes on exports	-38 (exogenous)	-38
Imports - competing	4342	4337
- non-competing	656	658
GNP	37059	36991

Source : Dixon, Hannover and Vincent (1978).

Table A2.2 : Macro-economic indicators for alternative labour output scenarios, actual 1971-72 and SNAPSHOT projections 1990-91

Item	Actual 1971-72[a]	SNAPSHOT projections 1990-91[b]		
		Scenario 1 Base scenario	Scenario 2 Across the board reduction in the labour output ratio by 10%	Scenario 3 Across the board increase in the labour output ratio by 10%
Consumption[c] [d]	22.2 (5.0)	64.7 (5.8)	73.0 (6.5)	57.9 (5.2)
Gross Investment[e]	9.4 (6.9)	22.0 (4.6)	25.2 (5.3)	19.3 (3.9)
Government Purchases[f]	4.9 (5.9)	11.8 (4.7)	11.8 (4.7)	11.8 (4.7)
Exports	5.4 (8.4)	11.3 (4.0)	12.1 (4.3)	10.1 (3.4)
Imports[g]	-5.0 (6.5)	-13.6 (5.4)	-14.8 (5.9)	-12.5 (4.9)
GDP	36.9 (5.5)	96.2 (5.2)	107.3 (5.8)	86.6 (4.6)
Workforce[h]	5.1 (2.7)	7.75 (2.2)	7.75 (2.2)	7.75 (2.2)
GDP/Worker[i]	7,235 (2.8)	12,413 (2.9)	13,845 (3.5)	11,174 (2.3)
Average Wage[j]	4,237	8,135 (3.5)	9,032 (4.1)	7,410 (3.0)
Consumption/Person[k]	1,740 (3.0)	3,924 (4.4)	4,427 (5.0)	3,512 (3.8)
GDP/Person	2,893 (3.5)	5,835 (3.8)	6,508 (4.4)	5,252 (3.2)
Investment/GDP[l]	25.5	22.9	23.5	22.3
Exchange rate[m]		.74	.66	.83

Table A2.3 : Effect on industry growth rates of a 10 per cent increase in the labour/output ratio, 30 most affected industries, relative to the base scenario.

Input-output industry	Rank	Percentage growth rate decrease [a]	Trade orientation [b] [c]
Clothing and footwear	1	.299	M
Motor vehicles and parts	2	.254	M
Textile products	3	.201	M
Other machinery and equipment	4	.194	M
Basic iron and steel	5	.186	E
Fruit, vegetables, oils, fats	6	.182	M
Paper products	7	.182	M
Leather products	8	.181	M
Scientific and electronic equipment	9	.177	M
Sheep and cereal grains	10	.176	E
Crude petroleum	11	.176	M
Tobacco products	12	.176	M
Forestry and logging	13	.171	M
Food products n.e.c.	14	.154	E
Milk products	15	.146	E
Fabricated metal products	16	.144	M
Chemicals	17	.142	M
Cereal, flour, confectionery	18	.136	E
Household appliances	19	.133	M
Water transport	20	.133	E
Banks, finance, insurance	21	.132	E
Other transport equipment	22	.131	M
Wholesale trade	23	.131	E
Road transport	24	.130	E
Other farming	25	.130	M
Non-metallic n.e.c.	26	.127	M
Other metallic minerals	27	.127	E
Services to agriculture	28	.126	M
Other manufacturing	29	.123	M
Petroleum and coal products	30	.123	M

Source: IMPACT documentation

Notes :

(a) Proportionate differences (negative) in projected growth rates in domestic production, 1971-72 to 1990-91 (Scenario 3 relative to scenario 1).

(b) Industries are classified as import-competing (M) or exporting (E) on the basis of negative or positive net exports in 1974-75 and non-traded (NT) on the basis of no exports or imports in 1974-75.

(c) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

Table A2.4. 30 most affected industries: 10 per cent decrease in labour/output ratio

Input-output industry	Rank	Proportionate growth rate increase (a)	Trade orientation (b)(c)
Clothing and footwear	1	.319	M
Motor vehicles and parts	2	.277	M
Textile products	3	.225	M
Other machinery and equipment	4	.216	M
Basic iron and steel	5	.206	E
Paper products	6	.201	M
Scientific and electronic equipment	7	.200	M
Leather products	8	.197	M
Tobacco products	9	.192	M
Sheep and cereal grains	10	.188	E
Fruit, vegetables, oils and fats	11	.186	M
Forestry and logging	12	.184	M
Crude petroleum	13	.176	M
Food products n.e.c.	14	.161	E
Fabricated metal products	15	.160	M
Chemicals	16	.158	M
Milk products	17	.149	E
Other transport equipment	18	.148	M
Water transport	19	.147	E
Household appliances	20	.147	M
Banks, finance and insurance	21	.145	E
Wholesale trade	22	.143	E
Road transport	23	.141	E
Other manufacturing	24	.140	M
Cereal, flour, confectionery	25	.137	E
Other farming	26	.137	M
Non-metallic minerals n.e.c.	27	.137	M
Other metallic minerals	28	.135	E
Printing products	29	.135	M
Retail trade	30	.135	E

Source: IMPACT documentation

Notes: (a) Proportionate differences (positive) in projected growth rates in domestic production, 1971-1972 to 1990-1991 (Scenario 2 relative to Scenario 1).

(b) Industries are classified as import-competing (M) or exporting (E) on the basis of negative or positive net exports in 1974-1975 and non-traded (NT) on the basis of no exports or imports in 1974-1975.

(c) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

Table A2.5 : Workforce composition under alternative labour/output ratio scenarios, 1971-72 and 1990-91.

	Actual 1971-72		SNAPSHOT projections								
			Base scenario			Scenario 2			Scenario 3		
	'000	%	'000	%	g[a]	'000	%	g[a]	'000	%	g[a]
Professional white collar[b]	193.3	3.8	318.3	4.1	2.7	306.4	4.0	2.5	330.2	4.3	2.8
Skilled white collar[c]	668.9	13.1	1199.0	15.5	3.1	1192.7	15.4	3.1	1205.8	15.6	3.2
Semi- and unskilled white collar[d]	1367.3	26.8	1950.9	23.9	1.6	1838.8	23.7	1.6	1863.4	24.1	1.6
Skilled blue collar - metal and electrical[e]	516.5	10.1	821.5	10.6	2.5	834.4	10.8	2.6	809.0	10.4	2.4
Skilled blue collar - building[f]	202.3	4.0	363.7	4.7	3.1	370.4	4.8	3.2	356.3	4.6	3.0
Skilled blue collar - other[g]	142.0	2.8	214.7	2.8	2.2	216.9	2.8	2.3	212.3	2.7	2.1
Semi- and unskilled blue collar[h]	1539.6	30.2	2402.6	31.0	2.4	2422.5	31.3	2.4	2384.7	30.8	2.3
Rural workers	402.2	7.9	481.0	6.2	0.9	479.3	6.2	0.9	480.5	6.2	0.9
Armed forces	65.7	1.3	96.0	1.2	2.0	85.4	1.1	1.5	105.6	1.4	2.5
Total	5098.6	100.0	7747.6	100.0	2.2	7747.6	100.0	2.2	7747.6	100.0	2.2

Source : IMPACT documentation.

Notes: (a) Average annual rate of growth, 1971-72 to 1990-91.
(b) Scientists, engineers, medical, societal, tertiary teachers, secondary teachers.
(c) Technical teachers, primary teachers, paramedical, technicians, creative, government, employers.
(d) Clerical, sales, semi-skilled medical, audio visual.
(e) Metal trades, electrical trades, instrument trades.
(f) Wood trades, brick, stone and glass, painters.
(g) Food trades, textile trades, printing trades.
(h) Semi skilled metal, electrical, building, miners, divers, protective services, services, labourers.

Table A2.6 : Macro-economic indicators for alternative international trade scenarios actual 1971-72 and SNAPSHOT projections 1990-91

	Actual 1971-72[a]	SNAPSHOT projections 1990-91[b]		
		Scenario 1 Base scenario[b]	Scenario 4 20 per cent increase in the level of exports	Scenario 20 per c increase the leve of manu-factured exports
Consumption[c][d]	22.2 (5.0)	64.7 (5.8)	65.0 (5.8)	64.8 (5.8)
Gross investment[e]	9.4 (6.9)	22.0 (4.6)	22.5 (4.7)	22.3 (4.6)
Government purchases[f]	4.9 (5.9)	11.8 (4.7)	11.8 (4.7)	11.7 (4.7)
Exports	5.4 (8.4)	11.3 (4.0)	13.6 (5.0)	12.4 (4.5)
Imports[g]	-5.0 (6.5)	-13.6 (5.4)	-16.7 (6.6)	-15.2 (6.0)
GDP	36.9 (5.5)	96.2 (5.2)	96.2 (5.2)	96.1 (5.2)
Workforce[h]	5.1 (2.7)	7.75 (2.2)	7.75 (2.2)	7.75 (2.2)
GDP/Worker[i]	7,235 (2.8)	12,413 (2.9)	12,413 (2.9)	12,400 (2.9
Average wage[j]	4,237	8,135 (3.5)	8,132 (3.5)	8,134 (3.5)
Consumption/person[k]	1,740 (3.0)	3,924 (4.4)	3,942 (4.4)	3,930 (4.4)
GDP/person[k]	2,893 (3.5)	5,835 (3.8)	5,835 (3.8)	5,828 (3.8
Investment/GDP[l]	26.5	22.9	23.4	23.2

Source : IMPACT documentation.

Notes:

(a) Average growth rates (per cent per annum) for 1962-63 to 1971-72 are in parentheses beneath the actual data for 1971-72.
(b) Average growth rates (per cent per annum) for 1971-72 to 1990-91 are in parentheses beneath the actual data for 1990-91.
(c) Consumption, investment, government expenditure, exports, import and GDP are measured in 1971-72 prices, $ billions.
(d) Includes net taxes on consumption.
(e) Includes net taxes on investment.
(f) Government expenditure, exports and workforce projections are exogenous to SNAPSHOT.
(g) Trade was assumed to be balanced in 1990-91 on foreign exchange account i.e. foreign exchange value of exports equals foreign exchange cost of imports. However, the data presented here are valued at 1971-72 prices. Valued in this way, imports exceed exports in 1990-91 because of tariffs in the base year and favourable movements in the terms of trade over 1971-72 to 1990-
(h) Measured in millions.
(i) GDP/worker, average wage, consumption/person and GDP/person are measured in 1971-72 prices.
(j) Total annual wage bill/workforce, in dollars.
(k) The population for 1971-72 is 12.756 million and population projected for 1990-91 is 16.485 million.
(l) Measured as a percentage.

Table A2.7: Effect on industry growth rates of 20 per cent across the board increase in the levelof exports, 15 most positively and 15 most negatively affected industries relative to base scenario

(a) 15 most positively affected industries

Input-output industry	Rank	Percentage Growth Rate Increase(a)	Increase in Import Penetration(b)	Trade Orientation(c)
Iron	1	.234	0	E
Sheep and cereal grains	2	.194	.001	E
Other Metallic Minerals	3	.179	.006	E
Other Basic Metal Products	4	.142	.013	E
Fishing, Trapping, Hunting	5	.109	.018	E
Meat Products	6	.108	.002	E
Services to Agriculture	7	.088	-	M
Cattle, Pigs and Poultry	8	.077	.001	E
Coal	9	.070	-	E
Services to Mining	10	.068	-	M
Water Transport	11	.064	.030	E
Rail Transport	12	.053	.007	E
Road Transport	13	.039	-	E
Electricity	14	.029	-	NT
Milk Products	15	.027	.007	E

Table A2.7 (cont'd)

(b) 15 Most negatively affected industries

Input-output industry	Rank	Percentage Growth Rate Decrease (e)	Increase in Import Penetration	Trade Orientation(d)
Crude Petroleum	1	.272	.075	M
Scientific and electronic Equipment	2	.226	.083	M
Textile Products	3	.182	.063	M
Clothing and footwear	4	.180	.069	M
Other Machinery and Equipment	5	.145	.077	M
Motor Vehicles and parts	6	.136	.074	M
Paper Products	7	.122	.045	M
Other Manufacturing	8	.106	.075	M
Fruit, Vegetables, Oils, Fats	9	.097	.053	M
Petroleum and coal Products	10	.097	.076	M
Chemicals	11	.078	.045	M
Leather Products	12	.076	.053	M
Household Appliances	13	.075	.066	M
Rubber and plastics Products	14	.073	.063	M
Basic Iron and steel	15	.067	.040	E

Source: IMPACT documentation

Notes:

(a) Proportionate differences (positive) in projected growth rates in domestic production, 1971-72 to 1990-91 (scenario 4 relative to scenario 1).

(b) Percentage point increase in import penetration, given by the ratio of imports to imports plus domestic production. (Scenario 4 relative to scenario 1).

(c) Industries are classified as import-competing (M) or exporting (E) or non-traded (NT) on the basis of negative or positive net exports in 1974-75, or no exports or imports in 1974-75.

(d) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

(e) Proportionate differences (negative) in projected growth rates in domestic production, 1971-72 to 1990-91 (scenario 4 relative to scenario 1).

Table A2.8 : Effect on industry growth rates of a 20 per cent increase in the level of manufactured exports, 15 most positively and 15 most negatively affected industries relative to base scenario

(a) 15 most positively affected industries

Input output industry	Rank	Percentage growth rate increase(a)	Increase in import penetration(b)	Trade orientation(c)
Other Basic Metal Products	1	.158	.006	M
Other metallic minerals	2	.131	.003	E
Meat Products	3	.109	.001	E
Cattle, Pigs and Poultry	4	.077	.000	E
Sheep and Cereal Grains	5	.039	.001	E
Food Products nec	6	.036	.010	E
Electricity	7	.033	-	NT
Services to Agriculture	8	.031	-	M
Services to Mining	9	.030	-	M
Milk Products	10	.030	.004	E
Iron	11	.018	-	E
Coal	12	.017	-	E
Rail Transport	13	.014	.003	E
Road Transport	14	.012	-	E
Flour Cereal Confectionary	15	.009	.006	E

Table 12.8 (cont'd)

(b) 15 most negatively affected industries

Input output industry	Rank	Percentage growth rate decrease(a)	Increase in import penetration(b)	Trade orientation(c)
Crude Petroleum	1	.141	.039	M
Scientific and Electronic Equipment	2	.114	.045	M
Clothing and Footwear	3	.099	.038	M
Textile Products	4	.089	.033	M
Motor Vehicles and Parts	5	.062	.040	M
Paper Products	6	.058	.022	M
Other Machinery and Equipment	7	.058	.041	M
Other Manufacturing	8	.050	.040	M
Air Transport	9	.045	.035	M
Leather Products	10	.043	.028	M
Petroleum and Coal Products	11	.037	.040	M
Household Appliances	12	.036	.033	M
Forestry and Logging	13	.036	.003	M
Rubber and Plastic Products	14	.036	.032	M
Fruit, Vegetables, Oils, Fats	15	.035	.027	M

Source: IMPACT documentation

Notes:

(a) Proportionate differences (positive) in projected growth rates in domestic production, 1971-72 to 1990-91 (scenario 5 relative to scenario 1).

(b) Percentage point increase in import penetration, given by the ratio of imports to imports plus domestic production. (scenario 5 relative to scenario 1).

(c) Industries are classified as import-competing(M) or exporting(E) or non-traded(NT) on the basis of negative or positive net exports in 1974-75, or no exports or imports in 1974-75.

(d) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

(e) Proportionate differences (negative) in projected growth rates in domestic production, 1971-72 to 1990-91 (scenario 5 relative to scenario 1).

Table A2.9 : Workforce composition under alternative international trade scenarios, 1971-72 and 1990-91.

	Actual		SNAPSHOT projections, 1990-91								
	1971-72		Scenario 1			Scenario 4			Scenario 5		
	'000	%	'000	%	g(h)	'000	%	g(h)	'000	%	g(h)
1. Professional white collar(a)	193.3	3.8	318.3	4.1	2.7	318.7	4.1	2.7	318.4	4.1	2.7
2. Skilled white collar(b)	669.9	13.1	1199.0	15.5	3.1	1197.6	15.5	3.1	1198.1	15.5	3.1
3. Semi-and unskilled white collar (c)	1367.3	26.8	1850.9	23.9	1.6	1848.9	23.9	1.6	1848.3	23.9	1.6
4. Skilled blue collar metal and electrical (d)	516.5	10.1	821.5	10.6	2.5	811.8	10.5	2.4	819.1	10.6	2.5
5. Skilled blue collar - building (e)	202.3	4.0	363.7	4.7	3.1	364.4	4.7	3.1	364.1	4.7	3.1
6. Skilled blue collar - other (f)	142.8	2.8	214.7	2.8	2.2	214.1	2.8	2.2	215.1	2.8	2.2
7. Semi-and unskilled blue collar (g)	1539.6	30.2	2402.6	31.0	2.4	2391.9	30.9	2.3	2397.9	31.0	2.3
8. Rural workers	402.2	7.9	481.0	6.2	0.9	504.2	6.5	1.2	490.5	6.3	1.0
9. Armed services	65.7	1.3	96.0	1.2	2.0	96.0	1.2	2.0	96.0	1.2	2.0
Total	5098.6	100.0	7747.6	100.0	2.2	7747.6	100.0	2.2	7747.6	100.0	2.2

Source: IMPACT documentation

Notes:
(a) Scientists, engineers, medical, societal, tertiary teachers, secondary teachers
(b) Technical teachers, primary teachers, paramedical, technicians, creative, government, employers
(c) Clerical, sales, semi-skilled medical, audio visual
(d) Metal trades, electrical trades, instrument trades
(e) Wood trades, brick stone and glass, painters
(f) Food trades, textile trades, printing trades
(g) Semi skilled metal electrical, building, miners, divers, protective services production, services, labourers
(h) Average annual rate of growth, 1971-72 to 1990-91.

Table A2.10 : Macro-economic indicators for alternative employment scenarios, actual 1971-72 and SNAPSHOT projections 1990-91

Item	Actual 1971-72[a]	Scenario 1 Base scenario	Scenario 6 Full employment	Scenario 7 6% unemployment
Consumption[c,d]	22.2	64.7	67.8	63.2
	(5.8)	(5.8)	(6.1)	(5.7)
Gross Investment[e]	9.4	22.0	23.1	21.3
	(6.9)	(4.6)	(4.8)	(4.4)
Government purchases[f]	4.9	11.8	11.8	11.8
	(5.9)	(4.7)	(4.7)	(4.7)
Exports[f]	5.4	11.3	11.4	10.8
	(8.4)	(4.0)	(4.0)	(3.7)
Imports[g]	-5.0	-13.6	14.0	13.3
	(6.5)	(5.4)	(5.6)	(5.3)
GDP	36.9	96.2	100.1	93.8
	(5.5)	(5.2)	(5.4)	(5.0)
Workforce[h]	5.1	7.75	8.07	7.59
	(2.7)	(2.2)	(2.4)	(2.1)
GDP/Worker[i]	7,235	12,413	12,404	12,358
	(2.8)	(2.9)	(2.9)	(2.9)
Average wage[j]	4,237	8,135	8,133	8,136
		(3.5)	(3.5)	(3.5)
Consumption/Person[k]	1,740	3,924	4,112	3,833
	(3.0)	(4.4)	(4.5)	(4.2)
GDP/Person	2,893	5,835	6,071	5,689
	(3.5)	(3.8)	(4.0)	(3.6)
Investment/GDP[l]	25.5	22.9	23.1	22.7
Exchange rate[m]		.74	.71	.76

Source: IMPACT documentation.

Notes:

(a) Average growth rates (per cent per annum) for 1962-63 to 1971-72 are in parentheses beneath the actual data for 1971-72.

(b) Average growth rates (per cent per annum) for 1971-72 to 1990-91 are in parentheses beneath each of the projections for 1990-91.

(c) Consumption, investment, government expenditure, exports, imports and GDP are measured in 1971-72 prices. $ billions.

(d) Includes net taxes on consumption. (e) Includes net taxes on investment.

(f) These projections are exogenous to SNAPSHOT.

(g) Trade was assumed to be balanced in 1990-91 on foreign exchange account, ie., foreign exchange value of exports equals foreign exchange cost of imports. However, the data presented here are valued at 1971-72 prices. Valued in this way, imports exceed exports in 1990-91 because of tariffs in the base year and favourable movements in the terms of trade over 1971-72 to 1990-91.

(h) Measured in 1971-72 prices, dollars.

(i) Measured in millions.

(j) Total annual wage bill/workforce, in dollars.

(k) The population for 1971-72 is 12.756 million and the population projected for 1990-91 is 16.488 million.

(l) Expressed as a percentage.

(m) $A per unit of foreign currency.

Table A2.11 : Effect on industry growth rates of assuming full employment, 30 most affected industries relative to the base scenario.

Input-output Industry	Rank	Percentage growth rate increase[a]	Trade orientation[b] [c]
Clothing and footwear	1	.147	M
Motor vehicles and parts	2	.111	M
Textile products	3	.098	M
Leather products	4	.085	M
Fruit, vegetable oils, fats	5	.082	M
Other machinery and equipment	6	.082	M
Basic iron and steel	7	.079	E
Paper products	8	.078	M
Tobacco products	9	.075	M
Scientific and electronic equipment	10	.075	M
Forestry and logging	11	.069	M
Sheep and cereal grains	12	.069	E
Food products n.e.c.	13	.068	E
Chemicals	14	.067	M
Milk products	15	.066	E
Flour, cereals, confectionery	16	.062	M
Crude petroleum	17	.062	M
Fabricated metal products	18	.061	M
Water transport	19	.058	E
Other transport equipment	20	.057	M
Other farming	21	.057	M
Banks, finance, insurance	22	.056	E
Wholesale trade	23	.056	E
Road transport	24	.055	E
Household appliances	25	.054	M
Retail trade	26	.053	E
Services to agriculture	27	.053	M
Fishing, trapping, hunting	28	.053	E
Other manufacturing	29	.052	M
Non-metallic n.e.c.	30	.052	M

Source: IMPACT documentation
Notes :

(a) Proportionate differences (positive) in projected growth rates in domestic production, 1971-72 to 1990-91 (Scenario 6 relative to scenario 1).
(b) Industries are classified as import-competing (M) or exporting (E) on the basis of negative or positive net exports in 1974-75 and non-traded (NT) on the basis of no exports or imports in 1974-75.
(c) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

Table A2.12 : Effect on industry growth rates of increasing unemployment to 6 per cent, 30 most affected industries relative to base scenario.

Input-output Industry	Rank	Percentage growth rate decrease (a)	Trade orientation (b) (c)
Clothing and footwear	1	.061	M
Motor vehicles and parts	2	.054	M
Fruit, vegetables, oils, fats	3	.045	M
Sheep and cereal grains	4	.045	E
Crude petroleum	5	.045	M
Other machinery and equipment	6	.044	M
Basic iron and steel	7	.042	E
Textile products	8	.040	M
Forestry and logging	9	.040	M
Paper products	6	.038	M
Tobacco products	11	.037	M
Milk products	12	.037	E
Food products n.e.c.	13	037	E
Leather products	14	.036	M
Scientific and electronic equipment	15	.036	M
Flour, cereal, confectionery	16	.034	M
Fabricated metal products	17	.032	M
Services to farming	18	.031	M
Other farming	19	.030	M
Road transport	20	.030	E
Non-metallic n.e.c.	21	.030	M
Property and business services	22	.029	E
Water transport	23	.029	E
Gas	24	.029	NT
Other transport equipment	25	.029	M
Wholesale trade	25	.029	E
Other metallic minerals	27	.029	E
Petroleum and coal products	28	.029	M
Non-metallic mineral products	29	.028	M
Banks, finance, insurance	30	.028	E

Source: IMPACT documentation

Notes :

(a) Proportionate differences (negative) in projected growth rates in domestic production, 1971-72 to 1990-91 (Scenario 7 relative to scenario 1)

(b) Industries are classified as import-competing (M) or exporting (E) on the basis of negative or positive net exports in 1974-75 and non-traded (NT) on the basis of no exports or imports in 1974-75.

(c) Classified on a strict basis as importing or exporting, although for some industries the traded component is very small.

Table A2.13 : Workforce composition under alternative employment scenarios, 1971-72 and 1990-91.

	Actual 1971-72		SNAPSHOT projections 1990-91								
			Base scenario			Full employment			6% unemployment		
	'000	%	'000	%	g[h]	'000	%	g[h]	'000	%	g[h]
Professional white collar[a]	193.3	3.8	318.3	4.1	2.7	326.5	4.0	2.8	314.3	4.1	2.6
Skilled white collar[b]	668.9	13.1	1199.0	15.5	3.1	1246.1	15.4	3.3	1175.9	15.5	3.0
Semi- and unskilled white collar[c]	1367.3	26.8	1850.9	23.9	1.6	1923.8	23.9	1.8	1815.7	23.9	1.5
Skilled blue collar, metal and electrical[d]	516.5	10.1	821.5	10.6	2.5	860.9	10.7	2.7	801.4	10.6	2.3
Skilled blue collar, building[e]	202.3	4.0	363.7	4.7	3.1	381.3	4.7	3.3	353.9	4.7	3.0
Skilled blue collar, other[f]	142.8	2.8	214.7	2.8	2.2	222.0	2.8	2.3	209.8	2.8	2.0
Semi- and unskilled blue collar[g]	1539.6	30.2	2402.6	31.0	2.4	2510.4	31.1	2.6	2349.3	31.0	2.2
Rural workers	402.4	7.9	481.0	6.2	0.9	500.9	6.2	1.2	469.9	6.2	0.8
Armed forces	65.7	1.3	96.0	1.2	2.0	96.0	1.2	2.0	96.0	1.3	2.0
Total	5098.6	100.0	7747.6	100.0	2.2	8070.1	100.0	2.4	7586.2	100.0	2.1

Source: IMPACT documentation

Notes :

(a) Scientists, engineers, medical, societal, tertiary teachers, secondary teachers.
(b) Technical teachers, primary teachers, paramedical, technicians, creative, government, employers.
(c) Clerical, sales, semi-skilled medical, audio visual.
(d) Metal trades, brick, stone and glass, painters.
(e) Wood trades, brick, stone and glass, painters.
(f) Food trades, textile trades, printing trades.
(g) Semi skilled metal electrical, building, miners, divers, protective services, production services, labourers.
(h) Average annual rate of growth, 1971-72 to 1990-91.

References

Aislabie, C.J., Ip, P.C., and Stanton, P.J. (1975), A Statistical Study of the Comparative Advantage of Australian Industry, AGPS, Canberra.

Australian Bureau of Statistics (1976-77), Australian National Accounts, No. 5204.0.

Australian Bureau of Statistics (various issues), Australian National Accounts: Gross Product by Industry at Current and Constant Prices, No. 5211.0.

Australian Bureau of Statistics (1977, 1978), Australian Yearbook, No. 1301.0.

Australian Bureau of Statistics (1975-76), Balance of Payments, No. 5301.0.

Australian Bureau of Statistics, Census of Mining Establishments; Summary of Operations, No. 8401.0.

Australian Bureau of Statistics (various issues), Consumer Price Index, No. 6401.0.

Australian Bureau of Statistics (1979), Digest of Current Economic Statistics, No. 1305.0.

Australian Bureau of Statistics (1980), Finance Companies in Australia, No. 5614.0.

Australian Bureau of Statistics, Foreign Investment, No. 5205.0.

Australian Bureau of Statistics (1972-73), Foreign Ownership and Control in Manufacturing, No. 5322.0.

Australian Bureau of Statistics (1973-74), Foreign Ownership and Control in the Mining Industry, No. 5317.0.

Australian Bureau of Statistics (various issues), Australian National Accounts, Input-Output Tables, No. 5209.0.

Australian Bureau of Statistics (various issues), The Labour Force, Nos. 6202.0 and 6204.0.

Australian Bureau of Statistics (1973-74, 1975-76), Manufacturing Establishments, Detail of Operation by Industry Class, Australia, No. 8203.0.

Australian Bureau of Statistics (1976-77), Manufacturing Establishments, Summary of Operations by Industry Class, No. 8202.0.

Australian Bureau of Statistics (various issues), New Capital Expenditure by Private Enterprises in Australia, No. 5626.0.

Australian Bureau of Statistics (various issues), Overseas Trade, No. 5407.0.

Australian Bureau of Statistics (1978), Projections of the Population of Australia: 1977 - 2011, No. 3204.0.

Australian Bureau of Statistics, Population and Dwellings: Summary Tables, Australia, No. 2417.0.

Australian Bureau of Statistics (various issues), Wage Rate Index, No. 6314.0.

Australia: Energy Outlook (1980), An Esso Report.

Australian Bureau of Statistics, Mining Establishments: Details of Operations, No. 8203.0.

Balassa, B., (1977), Export Incentives and Export Performance in Developing Countries: A Comparative Analysis, World Bank Staff Working Paper No. 248, January.

Bureau of Agricultural Economics (various issues), Quarterly Review of Agricultural Economics.

Bureau of Industry Economics (1978), Research Report 1, Industrialisation in Asia: Some Implications for Australian Industry, AGPS, Canberra.

Bureau of Industry Economics (1979), Information Bulletin 1, Australia's Share of Imports by Developing Asian Countries 1965 to 1975, AGPS, Canberra.

Bureau of Industry Economics (1979a), Research Report 3, Employment of Demographic Groups in Australian Industry, AGPS, Canberra.

Bureau of Industry Economics (1979c), Research Report 4, The Economic Significance of Tourism in Australia, AGPS, Canberra.

Bureau of Industry Economics (1981b), Research Report 6, Features of the Australian Service Sector, AGPS, Canberra.

Bureau of Industry Economics (1981c), Forthcoming Research Report, Input Requirements for Australian Mineral Developments in the 1980s, AGPS, Canberra.

Bureau of Industry Economics (1979b), Research Report 2, Australian Industrial Development - Some Aspects of Structural Change.

Bureau of Industry Economics (1981a), Research Report 7, The Long-Run Impact of Technological Changes on the Structure of Australian Industry to 1990-91, AGPS, Canberra.

Bureau of Mineral Resources (1979), Australian Mineral Industry Review 1977, AGPS, Canberra.

Carter, Anne P. (1970), Structural Change in the American Economy, Harvard Studies in Technology and Societies, Harvard University Press, Cambridge, Massachusetts.

Central Statistical Office (UK) (1979), Economic Trends Annual Supplement.

Chapman, D. (1979), 'Forecasting Technological Coefficients', Bureau of Industry Economics, Working Paper No. 1.

Chapman, D. (1981), forthcoming working paper 'Endogenising Trade in the SNAPSHOT Model', Bureau of Industry Economics.

Chenery, H.B. (1960) 'Patterns of Industrial Growth', American Economic Review.

Committee of Economic Inquiry (1965), Report, AGPS, Canberra.

Committee of Inquiry into Technological Change in Australia 1980, Report, AGPS, Canberra.

Committee to Advise on Policies for Manufacturing Industry (1976), Report, AGPS, Canberra.

Corden, W. (1980, 'The Relationships Between Macroeconomic Policies and Industrial Policies', paper presented to International Symposium on Industrial Policies for the '80s, Spanish Ministry for Industry and Energy and OECD, Madrid.

Crawford, J. and Okita, S. (1979), Australia-Japan: Issues in the Economic Relationships, Australia-Japan Economic Relations Research Project, Canberra.

Department of Employment and Industrial Relations (various issues), Monthly Review of the Employment Situation.

Department of Industry and Commerce (1979), The Australian Aluminium Industry - Supply Potential, AGPS, Canberra.

Department of Industry and Commerce (1980), Survey of Major Mining and Manufacturing Projects.

Department of Overseas Trade, Central Statistical Section, Exports of Manufactures and Primary Products.

Department of Trade and Resources (1980a), Australia's Mineral Resources, AGPS, Canberra.

Department of Trade and Resources (1980b). Internal Research Memorandum No. 2, Resource Investment in Prospect and the Balance of Payments - Some Implications for the Economy.

Department of Trade and Resources (various issues), Economic Indicators, AGPS, Canberra.

Department of Trade and Resources, Australia's Pattern of Trade: Part I, AGPS, Canberra.

Department of the Treasury (1979), Round-up of Economic Statistics, AGPS, Canberra.

Dixon, P.B., Harrower, J.D. and Powell, A.A. (1976), 'SNAPSHOT, a long term Economy wide Model of Australia: Preliminary Outline', IMPACT Preliminary Working Paper, No. SP-01, Melbourne.

Dixon, P.B., Harrower, J.D. and Vincent, D.P. (1978) 'Validation of the SNAPSHOT Model', IMPACT Preliminary Working Paper No. SP-12, Melbourne.

Dixon, P.B. and Vincent, D.P. (1979), 'The SNAPSHOT Model: Underlying Theory and an Application to the Study of the Implications of Technological Change in Australia to 1990', IMPACT Draft Preliminary Working Paper, Melbourne.

Dowie, J.A. (1970), 'The Service Ensemble', Australian Economic Development in the Twentieth Century, C. Forster (ed), George Allen and Unwin Ltd., Great Britain.

Edwards, C.T. (1980), 'South Korea's Industrial Development Strategy: Implications for Australia', Australian Economic Review, No. 44.

Fisher, A.G. (1933), 'Capital and the Growth of Knowledge', Economic Journal, No. 43.

Foreign Investment Review Board Report (1978), AGPS, Canberra.

Freebairn, J.W. (1978), 'Projections of Australia's World Trade Opportunities: Mid and Late Nineteen Eighties', IMPACT Working Paper No. 1-07.

GATT (1980) Annual Report.

Gregory, R.G., and Martin, L.D. (1976), 'An Analysis of Relationships Between Import Flows to Australia and Exchange Rate and Tariff Changes', Economic Record, No. 137.

Gregory, R.G. (1976), 'Some Implications of the Growth of the Mining Sector', The Australian Journal of Agricultural Economics, Vol. 20(2).

Gregory, R.G., and Duncan, R.C. (1978), 'The Relevance of Segmented Labour Market Theories: Equal Pay for Women', paper presented to the Seventh Conference of Economists, Macquarie University, Sydney.

Gregory, R.G. (1978), 'Structural Change, Prices, Employment and Imports in Australian Manufacturing Industry', paper presented at the Seventh Conference of Economists, Macquarie University.

Gregory, R.G., and Duncan, R.C. (1979), The Australian Labour Market in the Seventies in Key Issues in the Seventies, Reserve Bank Conference on Applied Economics, Sydney.

Gruen, F.H. (1975), 'The 25% Tariff Cut: Was it a Mistake', in The Australian Quarterly.

Healey, D.T. (1980), 'Structural Adjustment Within the Economies of Australia, Japan, Sweden and the United Kingdom in Response to Imports from Developing Countries: Lessons for Australia', Economics Department Papers, University of Adelaide, SA.

Hussey, O. (1979), 'Longer Term Export Prospects for Australian Agriculture', Quarterly Review of the Rural Economy, BAE.

International Monetary Fund (1978), The Rise in Protectionism, Washington, D.C.

International Monetary Fund (1980), International Financial Statistics, Washington, D.C.

Industries Assistance Commission (1976), Assistance to Manufacturing Industries in Australia, 1968-69 to 1973-74, AGPS, Canberra.

Industries Assistance Commission (various issues), Annual Report, AGPS, Canberra.

Industries Assistance Commission (1980), Approaches to General Reductions in Protection - Information Paper No. 1: Trends in the Structure of Assistance to Manufacturing, AGPS, Canberra.

Industries Assistance Commission (1979), Draft Report on Textiles, Clothing and Footwear - Part A, AGPS, Canberra.

Johns, B.L. and Metcalfe, J. (1980), 'The Increasing Competitiveness of Developing Economies and their Impact on Australian Industry', Bureau of Industry Economics, paper presented to conference 'Australian Industry: Pressures (or Opportunities?) for Change', Australian National University.

Kasper, W. and McMahon, P. (1976), 'Free Trade and Growth in the Australian Economy', Seminar Paper, Department of Economics, Research School of Social Studies, Australian National University.

Kasper, W. (1978a), 'Australia's Economic and Industrial Structures: Past Patterns and Prospective Trends' in Growth, Trade and Structural Change in an Open Australian Economy, W. Kasper and T.G. Parry (eds.), University of New South Wales, Centre for Applied Economic Research, Sydney.

Kasper, W. (1978b), 'Some Broad Perspectives of World Economic Growth' in Growth, Trade and Structural Change in an Open Australian Economy, W. Kasper and T.G. Parrey (eds.), University of New South Wales, Centre for Applied Economic Research, Sydney.

Krueger, A.O. (1978), 'Effects of Exports from Non-Industrial Countries on US Industries' in Growth, Trade and Structural Change in an Open Australian Economy, W. Kasper and T.G. Parry (eds.), University of New South Wales, Centre for Applied Economic Research, Sydney.

Lee, T., Hart, D. and Fitzpatrick, M. (1979), 'Future Demand for Textiles, Clothing and Footwear: An Australian Perspective', Bureau of Industry Economics, Working Paper No. 8.

Leontief, W. et al (1977), The Future of the World Economy, New York, Oxford University Press.

Marsden, J. and Milkovits, L. (1977), The Construction of Price and Quantity Indexes for Australian Trade Flows, Industries Assistance Commission, Canberra.

Marsden, J. and Anderssen, H. (1978), 'Employment Change in Manufacturing: The Role of Imports, Productivity and Output Growth', Australian Bulletin of Labour.

Marsden, J. and Anderssen, H. (1979), 'Structural Change: Exploring Some Perspectives', Australian Bulletin of Labour.

Marsden, J.S., and Hollander, G. (1980), The Effect of Internal Cost and Exchange Rate Changes on the Competitiveness of Australian Industry. Paper presented to the Conference Australian Industry: Pressures or Opportunities for Change, Australian National University.

National Population Inquiry (1975), Population and Australia; First Report: A Demographic Analysis and Projection, Vol. 1, AGPS, Canberra.

Norman, N.R. (1980), 'Should Industry Fear Resource Development? The "Gregory Thesis" and its Implications Reviewed', AIDA Bulletin, No. 322, September.

Organisation for Economic Co-operation and Development (various issues), Economic Outlook, OECD, Paris.

Organisation for Economic Co-operation and Development, Economic Surveys of Australia, OECD, Paris.

Organisation for Economic Co-operation and Development (1979), Economic Policy Committee, 'Prospects for Economic Growth', OECD, Paris.

Organisation for Economic Co-operation and Development (1979), Interfutures Project, 'Facing the Future, Mastering the Probable and Managing the Unpredictable', (Final Report), OECD, Paris.

Organisation for Economic Co-operation and Development (1980), National Accounts of OECD Countries, 1950-78, Vol. 1, OECD, Paris.

Parry, T.G. (1978), The Structure and Performance of Australian Manufacturing Industry, University of New South Wales, Sydney.

Phillips, G. Paul (1980), 'Australian Mining Developments in the 1980s', paper present to Seminar, The Next Ten Years, Monash University.

Policies for Development of Manufacturing Industry (1975), Jackson Committee Report, AGPS, Canberra.

Ranger Environmental Enquiry (1977), Second Report, AGPS, Canberra.

Report of the Committee on Australia's Relations with the Third World (1979), AGPS, Canberra.

Scully, J. (1979), 'Policies for the Development and Export of Energy Resources in the '80s', in Australia-Japan Energy Symposium Proceedings, Australian Japan Energy Symposium Committee, Sydney.

Select Committee on Foreign Ownership and Control of Australian Resources (1972), Report No. 1.

Smith, B. (1978), 'Australian Mineral Development, Future Prospects for the Mining Industry and Effects on the Australian Economy' in Growth, Trade and Structural Change in an Open Australian Economy, W. Kasper and T.G. Parry (eds.), University of New South Wales, Centre for Applied Economic Research, Sydney.

Stone, J.O. (1979), 'Australia in a Competitive World - Some Options', paper presented to the 21st General Management Conference of the Australian Institute of Management, Sydney.

Study Group on Structural Adjustment (1979), Report, March 1977, AGPS, Canberra.

United Nations Conference on Trade and Development (various issues), Trade in Manufactures of Developing Countries, UNCTAD, Geneva.

United Nations Industrial Development Organization (1978), 'The Impact of Trade with Developing Countries on Employment in Developed Countries', UNIDO Working Papers on Structural Changes No. 3, UNIDO/ICIAS 85.

White Paper on Manufacturing Industry (1977), AGPS, Canberra.

William, R.A. (1978), 'The Use of Disaggregated Cross-Section Data in Explaining Shifts in Australian Consumer Demand Patterns over Time', IMPACT Preliminary Working Paper No. SP-13, Melbourne.

World Bank (1978), 1977 World Bank Atlas, World Bank, Washington.