ECONOMIC RESEARCH PAPER

Business Investment in Western Australia

JANUARY 2006

Department of **Treasury and Finance**
Government of **Western Australia**

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BUSINESS INVESTMENT IN WESTERN AUSTRALIA

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CONTENTS

EXECUTIVE SUMMARY

Business investment is a critical component of economic activity in Western Australia, and has accounted for 15.4% of Gross State Product (GSP) since 1989-90, compared with 9.9% for the rest of Australia.

Business investment also has substantial relevance to the current national debate on infrastructure funding. In Western Australia, substantial business investment occurs in very remote locations, where infrastructure cannot always be shared amongst multiple users. The company, rather than the State, usually finances the infrastructure for such operations. Examples of this are the rail systems and ports of the Pilbara iron ore producers.

This paper aims to provide some insight into the determinants of business investment. It examines a range of factors that are considered by economic theory and Western Australian industry to be important for investment in the State.

The paper focuses on the varying significance of factors that influence business investment, rather than making recommendations as to how to increase business investment.

It focuses largely on investment in the mining industry, as this industry attracts more investment than any other industry in Western Australia by a large margin.

Business investment is usually regarded as the most volatile component of demand in any economy. This situation is exacerbated in Western Australia because investment is dominated by large-scale mining and resource projects that occur irregularly, but result in the injection of considerable investment when they occur.

Western Australia is part-way through the third major investment cycle since the Australian Bureau of Statistics first collected State-level data in 1985-86. The first was an expansion that peaked at $8.7 billion (real) in 1989-90 (ABS 2005a), before declining to $6.4 billion in 1991-92. From this point, business investment increased until it reached $14.0 billion[1] in 1997-98, and then declined to $9.6 billion in 2000-01. Business investment has since entered a new expansionary phase, with investment reaching a new high of $16.5 billion in 2004-05, the latest year on record.

Investment in the mining industry accounts for a large proportion of business investment in Western Australia, contributing around 55% (ABS 2005f) of measured business investment by industry over the past decade. Additionally, mineral resource processing, such as nickel and alumina refining, accounts for much of the manufacturing investment in Western Australia.

There are two main reasons for the dominance of the mining and resource industry in Western Australia. The first is that Western Australia is blessed with significant economically viable deposits of mineral resources. Secondly, the concentration of Australia's population has always been on the eastern seaboard and so the manufacturing and finance industries have tended to locate there, exporting to the relatively small Western Australian market.

While the absolute scale of investment should increase as the Western Australian economy expands over time, it tends to be cyclical in the short to medium term. In particular, economic theory indicates that resource investment should increase when commodity prices increase, and vice versa. It should also increase when the rental price of capital (a measure of the return demanded by holders of capital before they will commit capital to a project) falls.[2]

Evidence of the impact of commodity prices on investment is mixed. Although some historical relationship appears to exist, particularly with nominal US dollar ($US) denominated commodity prices, there can be relatively long time lags between movements in commodity prices and changes in investment. For example, the rapid rise in commodity prices from 1999 was not accompanied by a recovery in business investment until 2001-02.

While a single rental price of equity capital for Western Australian business or the Western Australian mining industry could not be calculated, conditions and sentiment in equity markets towards mining and resource companies appear to exert a large influence on business investment. Capital was readily available to the mining industry during the 1993 to 1998 period, when investment increased rapidly.

1 Excluding the sale of the Dampier to Bunbury Natural Gas Pipeline, which is notionally classified as business investment.
2 Although some theories of business investment assign no role for the cost of capital.

Subsequently, however, investors tired of the low returns offered by mining companies forcing companies to become more careful with how they allocated capital. At this time, competition from 'high tech' speculative investments was fierce. Reflecting this, business investment in the Western Australian mining sector fell by a total of 58.8% between 1997-98 and 1999-2000. Since that time, the end of the 'tech-boom' and strong world demand, particularly from China, has seen the resources industry return to favour amongst investors, and business investment in Western Australia has grown strongly.

Rapid productivity improvement in the mining industry appears to be a factor in the investment boom of the 1990s, while the decline in investment in the late 1990s appears to be partially related to a slowing productivity in the mining industry.

The influence of 'local' factors particularly relevant to the Western Australian situation, such as determinants of exploration expenditure, energy costs and an increase in takeover and merger activity in the resources sector, is less apparent with supporting data harder to find.

There are many potential reasons as to why exploration expenditure (particularly for minerals) declined during the late 1990s before staging a slight recovery the past two years, including: a decline in worldwide exploration; declining discovery rates; greater discipline in the use of shareholders' funds by mining companies; and a shift to more prospective offshore locations. None, however, could be isolated as the most significant factor. The impact of native title claims on exploration is not considered in this paper.

Energy costs are significant for resource processing projects and the high price of electricity in Western Australia relative to the rest of Australia is thought to have been a deterrent to investment in the past, although this has been offset to some extent by the availability of cheap natural gas.

The level of takeover activity in the resource sector, driven by a desire to improve economies of scale or a change in strategic direction by some mining companies, can also impact on business investment by diverting capital away from new projects.

This paper has been prepared to improve the understanding of the issues and interrelationships determining business investment in Western Australia, but does not pretend to supply all of the answers due to the complexity of the subject and the limited availability of data at the State level.

We hope that it is useful and interesting in that regard.

1. INTRODUCTION

Business investment is a key driver of growth in Western Australia for two reasons. First, it is a major demand component of the Western Australian economy, accounting for an average of 15.4% of Gross State Product (GSP) over the period for which data have been compiled by the Australian Bureau of Statistics,[3] compared with 9.9% for the rest of Australia.

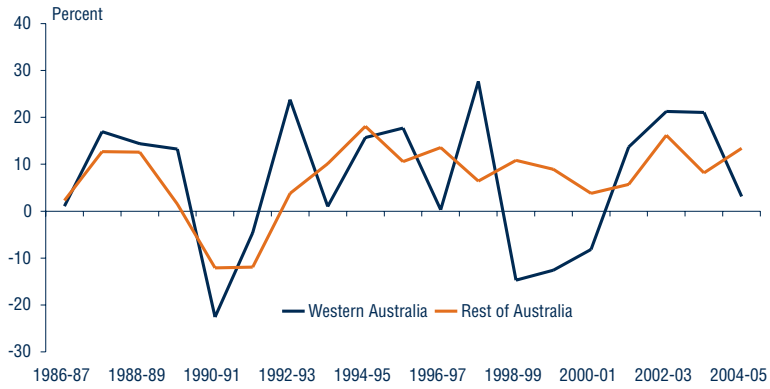
Second, in the longer term, investment means an increase in the capital stock of Western Australia, including the State's infrastructure, which influences how much the State can produce. Western Australia's strong export performance over the last decade was preceded by substantial investment in the mines and processing plants that supply the world market.

Business investment is extremely volatile in Western Australia, which is due to the fact that the Western Australian economy is firmly grounded in the minerals and energy industries, which have massive capital requirements initially, but relatively long productive lives. As a result, investment tends to be very lumpy.

For example, the following chart shows the annual percentage change in business investment in Western Australia and the rest of Australia from 1985-86 to 2004-05. Clearly, while both data series are volatile, business investment in Western Australia shows more peaks and troughs than the rest of the country.

Western Australian and Australian Business Investment

Real (Constant Prices), Annual Average Growth



Source: ABS Cat 5220.0.

The first cycle on record peaked in 1989-90, after growing by 11.5% per annum since data were first collected in 1985-86. It then, however, fell by 14.5% per annum until 1991-92.

Business investment in Western Australia increased strongly between 1991-92 and 1997-98, rising by 13.9% per annum and underwriting much of the State's strong economic growth over that period. However, investment fell by a total of 31.4% from 1997-98 to 2000-01, largely driven by a reduction in investment in the mining sector.

Since 2000-01, business investment has increased at an average annual rate of 14.4% per annum on the back of a new round of resource-related projects. This began with the commencement of the fourth train expansion of the North West Shelf project in September 2001, and has subsequently included a number of major expansions within the iron ore industry.

3 This paper utilises two sources of business investment data from the ABS: the State Accounts (ABS 2005a) annual figure, published since 1989-90; and the quarterly State Final Demand series (ABS 2005a), which began in 1985-86. Figures for the two series are not always totally consistent, due to revisions and different publication times. Data in this paper are current to the 2004-05 State Accounts and the September quarter 2005 State Final Demand data. Unless otherwise mentioned, State Accounts data are used for all comparisons from 1989-90 onwards, and State Final Demand data for comparison up to 1988-89, although the two series are totally consistent at the time of writing. All data exclude net sales of second-hand assets, including the sale of the Dampier to Bunbury Natural Gas Pipeline in 1997-98, which are transfers of existing assets from the public to the private sector.

2. DEFINITIONS

Investment can be defined as the accumulation (over time) of capital goods that provide real services to those that own or rent them. Investment may be undertaken for two purposes:

- to add to existing capital equipment or stocks; and
- to replace capital equipment that has depreciated, or stocks that have been reduced.

Capital goods can be divided into two types:

- working capital – which consists of stocks of raw materials, manufactured inputs and final goods awaiting distribution. Working capital investment helps firms to overcome supply bottlenecks or to accommodate a sudden surge in demand; and
- fixed capital – which consists of items such as plant, machinery, buildings or livestock. These assets provide services to their owners (or renters) that enable the production of goods and services throughout their working life.

This paper is concerned with investment in these fixed capital items or fixed capital formation. Hereafter, references to investment relate to private fixed capital formation.

Fixed capital formation can be further subdivided into business and dwelling investment. This paper focuses on business investment. Business investment can be defined as investment in:

- buildings and structures, which includes such assets as industrial, commercial, and non-dwelling residential buildings; land development; roads; bridges; wharves; harbours; railway lines; pipelines; and power and telephone lines (ABS 2000);
- machinery and equipment, which includes: vehicles; aircraft; ships; electrical apparatus; office equipment; and furniture; and
- intangible fixed assets, which includes mainly computer software, mineral exploration, livestock, films and sound recordings.

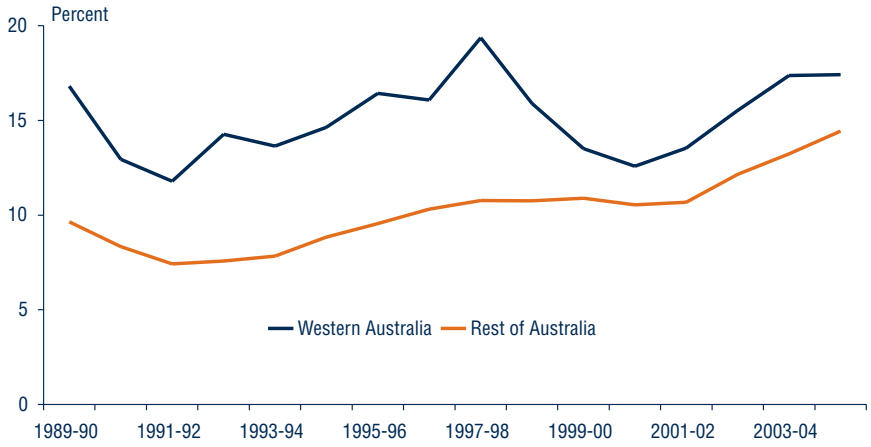
Both the private sector and governments may undertake fixed capital investment. This paper only considers investment by the private sector, but may include infrastructure constructed by private companies.

3. BUSINESS INVESTMENT IN WESTERN AUSTRALIA

3.1 Overview

Business investment is more important to the Western Australian economy than the rest of Australia, with its share of GSP exceeding that for the rest of the nation. This share grew to 17.4% in 2003-04 and 2004-05, on the back of the current expansion in business investment, compared with the record of 19.4% in 1997-98.

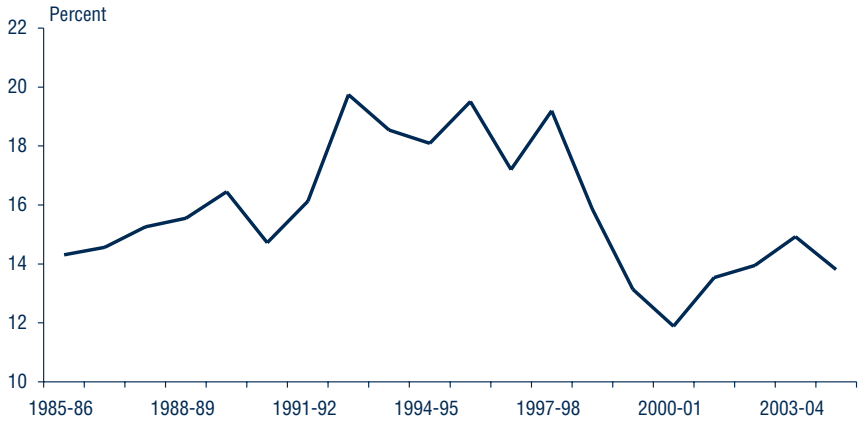
Business Investment Share of Gross State Product



Source: ABS Cat 5220.0.

Reflecting this, Western Australia accounts for a disproportionately large share of the nation's business investment. This share was particularly large between 1992-93 and 1997-98, when the share averaged around 18.7%, which was a reflection of the strength of the Western Australian economy relative to the rest of Australia. After the downturn in the late 1990s, however, this share has not increased to its 1990s levels despite strong business investment growth in Western Australia, which reflects strong investment growth in the remainder of the country.

Western Australian Share of Australian Business Investment

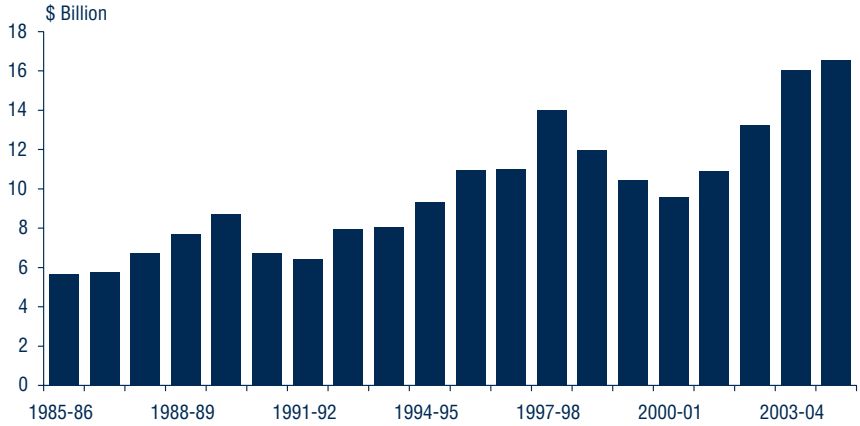


Source: ABS Cat 5220.0.

Strong growth in business investment has underwritten Western Australia's faster rate of economic growth than the national average. Production in the Western Australian economy, as measured by GSP, increased by an average of 4.1% per annum from 1989-90 to 2004-05 (ABS 2005e), compared with 3.1% for the rest of Australia (ABS 2005e).

Business Investment

Western Australian, Chain Volume (Constant Price)



Source: ABS Cat 5220.0.

Western Australia is part-way through the third major investment cycle since State business investment data were first released for 1985-86.[4] The first of these cycles commenced with an upturn from 1985-86 that peaked in 1989-90. Investment fell during the 1991 global recession, then picked up again in 1992-93 and continued growing strongly until 1997-98, as shown in the chart above.

The second upturn was much more pronounced than the first, with annual investment 118.4% greater in 1997-98 than in the trough of 1991-92, compared with a peak of only 53.1% greater in 1989-90 relative to 1985-86.

The downturn from 1997-98 to 2000-01 was quite severe and much more specific to Western Australia than the downturn during the early 1990s recession, primarily because the most recent downturn was very specific to the resources industry. While Western Australia usually accounts for a disproportionately high share of the nation's investment, its share fell to only 12.2% in 2000-01 – the lowest on record.

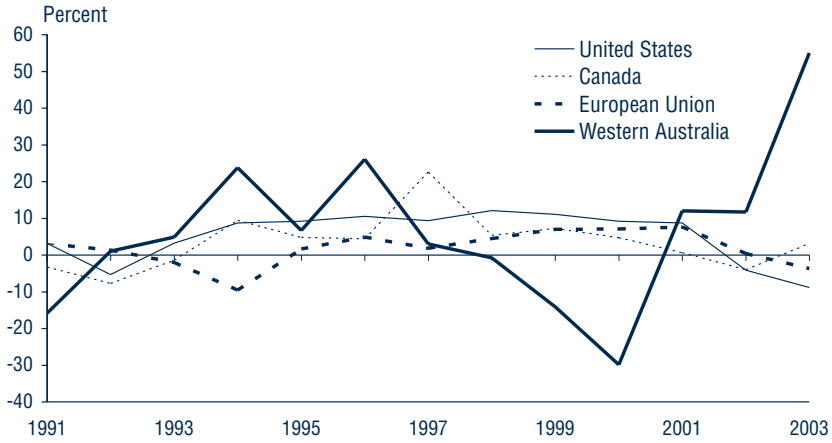
The current expansion has led to the level of business investment in 2004-05 being 71.5% greater than in 2000-01. However, the severity of the downturn to 2000-01 means that, even during the current investment boom, the State has not recovered the share of national business investment that it held in 1997-98.

Compared with other developed countries, Western Australia's business investment cycle is quite volatile. This appears to be related to the high concentration of mining in Western Australian business investment and Western Australia's reliance on Asia as an export market.[5]

4 This upturn may have begun in previous years for which no data are available.
5 Although the large fluctuations in the $A relative to the $US contributes substantially to this volatility.

Real Business Investment Growth

Selected Regions, Annual Growth $US, Market Exchange Rates



Source: OECD Economic Outlook 77 Database – Annex Table 6, ABS Cat 5220.0.

This is illustrated by the dramatic fall in Western Australian business investment in the 1998 and 1999 calendar years, which corresponded with solid growth in the other jurisdictions. Analysis presented in this paper shows that the downturn in Western Australian business investment (triggered by the Asian financial crisis) was largely related to a downturn in resource sector investment.

In contrast, business investment in other countries (even in Canada, which is usually regarded as being highly reliant on mining) appears to have been driven by the continuing 'high-tech' or 'dot-com' boom.

As the dot-com boom ended, investment in the United States, Europe and Canada fell, and substantial excess capacity in communications infrastructure remained. However, in Western Australia, the resource sector-led recovery pushed business investment to a substantial growth in business investment from 2001 to 2004.

3.2 Investment by Industry

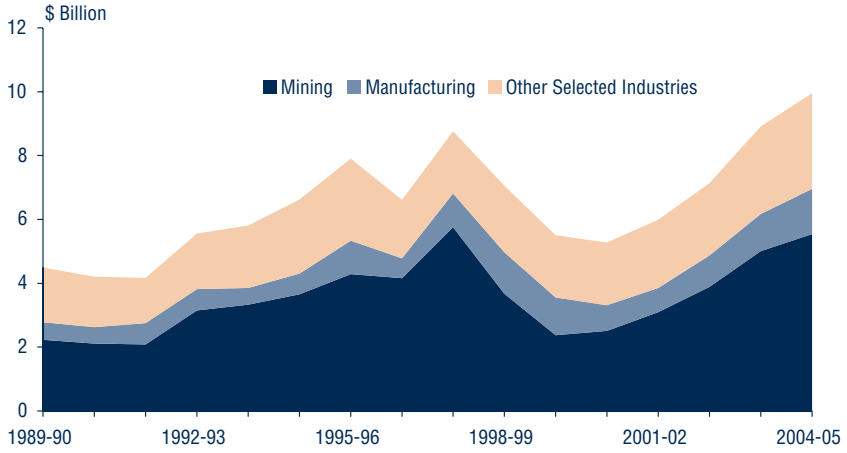
Industry investment data, although not definitive, indicate that the mining and mineral processing industry has attracted the greatest share of business investment in Western Australia since data have been available. Investment in the Western Australian mining industry reached a peak of 65.7% of measured investment in 1997-98, but fell to 43.1% by 1999-2000 (ABS 2005f), before recovering to 55.6% in 2003-04 and 2004-05.[6]

In comparison, investment in the mining industry accounted for just 9.9% of total business investment in the rest of Australia in 2004-05. Western Australia secured 54.0% of national mining investment in 2004-05, compared with the record of 59.7% in 1993-94 (ABS 2005f).

Access Economics Investment Monitor (2005)[7] data suggest that, in addition to direct mining investment, mineral processing consistently accounts for over 95% of manufacturing major project investment in the State. Investment in the manufacturing industry accounted for 14.2% of investment in Western Australia in 2004-05, compared with 23.7% in the rest of Australia.

Business Investment by Industry

Western Australia, Annual, Nominal (Current Price)



Source: ABS Cat 5625.0

6 The ABS industry investment data are not directly comparable to investment data in the State Accounts. This data considers only new capital expenditure, and not investment to replace depreciated equipment. The data also is only available in current prices (rather than chain weighted) and relies only on the ABS capital expenditure survey. The State Accounts data are based on the capital expenditure survey and other ABS surveys (ABS 2005c).

7 Access Economics is a private sector economics firm based in Canberra. The Access Economics Investment Monitor surveys industry to ascertain the level of project investment in each state.

There was a marked difference in the share of investment in the 'Other Selected Industries'[8] (other industries) of Western Australia and the rest of the nation. Investment in other industries was 66.4% of total investment in the rest of Australia in 2004-05, compared with only 30.1% in Western Australia (ABS 2005f). Western Australia attracted only 8.7% of total Australian investment in other industries, below the State's national GDP and population shares.

This implies that the Western Australian economy has become quite specialised, producing mainly the resource commodities in which it has a comparative advantage, and importing many services in which it does not.

Accordingly, the share of production of mining in the Western Australian economy has increased over the past 10 years. Mining as a share of State total factor income,[9] an approximation of GSP, increased from 14.7% in 1989-90 to a peak of 22.8% in 2000-01 (ABS 2005e).

Investment in the mining industry, as would be expected given its large share, accounts for much of the variability in Western Australian business investment. In this regard, the downturn in business investment between 1998-99 and 2000-01 was driven by a serious downturn in mining investment. In 1999-2000, mining investment was 58.8% lower (in current prices) than its level in 1997-98 (ABS 2005f), which explains why Western Australia's share of national business investment declined so markedly over this period.

The subsequent recovery in business investment has also been driven by the mining sector. Mining investment increased by 120.6% over the period from 2000-01 to 2004-05 in current price terms.

3.3 Summary

In summary:

- business investment is a more important component of the State economy than the national average; and
- business investment in Western Australia is heavily concentrated in the mining and resource processing industries.

Therefore, any discussion on business investment in Western Australia must focus on investment in the resources sector, the subject of the next chapter.

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8 The other industries category contains investment in all industries except mining, manufacturing, agriculture, dwellings and government. This includes industries such as wholesale and retail trade, accommodation, cafes and restaurants, transport and communications, finance and insurance and property and business services.

9 Total factor income consists of capital income or gross operating surplus (GOS) and compensation of employees. It is an approximation of GSP or total factor cost, but does not include net indirect taxes and subsidies. The ABS no longer publishes total factor cost by industry at the State level.

4. THE DOMINANCE OF MINING IN BUSINESS INVESTMENT IN WESTERN AUSTRALIA

4.1 Background

A major reason why the mining and resource industry attracts the greatest share of business investment in Western Australia is the State's comparative advantage in this industry.[10] Comparative advantage stems from the notion that every economy cannot do everything, and that each country or region should specialise in its most productive industry (or industries), then trading with other regions to satisfy its needs.

In the case of Western Australia, the opportunity cost, in terms of lost income from mineral and resources production, would be prohibitively high if resources were diverted to other areas of production.

Comparative advantage however, can only explain part of the story. In the traditional comparative advantage model, the level of resources in an economy is fixed (usually labour in the long run). This means that, if an adverse shock affects a major industry in a region, labour and capital are simply diverted to other industries.

However, in a region such as Western Australia, the population is relatively mobile. If a favourable development occurs in Western Australia, population tends to flow in from other States. In fact the rapid increase in Western Australia's population over the past decade has largely been driven by strong performance of the mining and resource industry. This means that opportunity cost, while still important, is not the only driver of industrial structure in Western Australia.

The relative size of the Western Australian economy in national and international terms (as well as its resource endowments) has significantly affected the suite of industries in which Western Australia could be successful, and hence the pattern of business investment by industry.

10 A region has a comparative advantage in the production of a good if the opportunity cost of producing that good, in terms of lost production of other goods from diverting resources to the production of the good in question, is less than other regions.

4.2 The Western Australian Economy

Western Australia is a small open economy in a relatively remote location away from most large population centres. It is relatively rich in natural resources including agricultural land and minerals, but has a population of only 2.0 million people (ABS 2005k) with GSP of A$94.8 billion (ABS 2004e). It is part of the still relatively small Australian market of 20.3 million people with national GDP of A$857.8 billion (ABS 2005e).

The relative size of the Western Australian economy means that, for a firm wishing to service the Australian (or international) market, the Western Australian market is likely to represent only a small proportion of total sales. This is critical to the way in which the Western Australian economy has developed.

4.3 A Model of Production Location

Krugman (1991) presented a simple model that illustrates why smaller population centres tend to specialise in 'location specific' industries, such as agriculture or mining. This model, which is slightly simplified here, explains why the industry investment pattern in Western Australia is so concentrated in the resources industry.

In this model there are two regions in a country, East and West, and two industries, mining and manufacturing. Mining is dependent on factors of production (mineral resources) that are location specific, and hence the location of these factors determines where the production takes place. It is assumed that these resources are equally divided between the two regions. Manufacturing, however, can be located in either region. That is, capital in the manufacturing industry is said to be 'footloose'. If manufactured goods are produced in only one region but sold in both, then transport costs must be incurred to service the other market.[11]

Alternatively, if manufactured goods are produced in both locations, then a fixed cost of establishing a plant will be incurred in both locations. Consumption of manufactured goods in this model is proportional to population.

Consider a manufacturing firm that wishes to service the entire national market. The model is as follows. Let:

F be the fixed cost of producing manufactured goods;
t be the cost of transporting manufactured goods between regions;
x be the sales of the firm;
P be the population of the country (West and East);
P_W be the population of the Western region; and
P_E be the population of the Eastern region.

11 The marginal cost of production is the same in both locations. Manufacturing does not use mining as an input and so the cost of transporting mining output to the East is not relevant.

Suppose the majority of the nation's population resides in the East, which is largely as a result of historical factors such as the time when each region developed. The manufacturing firm will set up its manufacturing base in the region with the largest market – the East. In this way, it will be close to the majority of its customers, thereby incurring the least possible transport cost.

Manufacturing firms must then decide how to service the West market. They can produce entirely in the East and export to the West, incurring a per-unit transport cost, t. Alternatively, they can set up a new manufacturing plant in the West, thereby avoiding any transport cost, but incurring a fixed cost, F.

For a single manufacturer, the cost of servicing the Western market entirely from its base in the East is:

$$tx\frac{P_W}{P}$$

This is the per-unit transport cost, multiplied by the total sales of the firm adjusted for the population share of the West. The firm will produce entirely from the East if the expected fixed cost of setting up in the West is greater than the total transport cost bill based on expected volumes.

$$F > tx\frac{P_W}{P}$$

Hence, the firm will tend to locate purely in the East if there are:

- large fixed costs of production, F – that is sufficiently strong economies of scale; and/or
- small transport costs, t.

In such a situation, population will drift from West to East to take up employment in the manufacturing industry until all manufacturing is undertaken there.

The classic example of industrial development of this type occurred in the later half of the 19th century in the United States. In the early stages of the development of the United States, transport costs were high and there were no real scale economies in manufacturing – hence no specialisation occurred and most regional centres developed a wide range of industries.

With the introduction of the telegraph in 1845 and the rollout of the rail system (1860 to 1890), regions were able to trade with each other, and so specialisation occurred. That is, transport costs fell dramatically (in addition to new manufacturing techniques that were scale-intensive). Brewers located in St Louis and Milwaukee, furniture manufacturers in the Great Rapids, meatworks in Illinios, and garment manufacturers in New England and New York (Meyers 1983).

Importantly, no new manufacturing centres developed in regions that were colonised after 1860, such as the Midwest, because these regions could be serviced from the existing manufacturing centres at a cheaper cost than if the manufacturers located in these regions. Any manufacturing that did occur in the non-industrialised regions tended to be the processing of natural resources that were extracted nearby.

4.4 Application to Western Australia

The situation described above can be directly applied to Western Australia.

There are no technical reasons why localised production could not service consumption demands of Western Australians. Yet many industries are located in the large centres of Sydney (finance) and Melbourne (heavy manufacturing), and Western Australian consumption has been largely serviced from the eastern states.

If a firm is subject to strong enough economies of scale, then it makes sense to locate all production on the eastern seaboard, where just under 90% of Australia's population was located in March 2005[12] (ABS 2005k). It is better to incur the cost of transport for the (approximately) 10% of its sales in Western Australia, rather than lose economies of scale by having a small production facility in Western Australia. Many goods are produced internationally in large population centres for the same reason.

Automobiles are the classic example of this, having a large up-front fixed capital cost relative to the cost of transport from Melbourne to Perth. Investment in Western Australia relating to automobiles and most other manufactures has largely been in wholesale and retail distribution chains, and service networks for maintenance and repair.[13]

12 Including South Australia and the Australian Capital Territory.
13 Although some small scale manufacturing was undertaken in Western Australia up until 1970.

A similar, although less pronounced, structure has occurred in many service industries in Western Australia, such as banking, finance and insurance. Historically, some production by local firms did develop in these sectors, but mostly local branches of national firms dominated these industries. These branches, however, were more than just distribution chains. For example, the granting of a bank loan requires more consideration on the part of the vendor than the sale of an automobile. In the past, this needed to be done in a face to face manner, so extensive investment in infrastructure was made.

Over the last 10-15 years, however, new technology has significantly altered the incentive to invest in these Western Australian distribution systems. In particular, automatic tellers, telephone and internet banking are now common. Indeed, the Commonwealth Bank estimates that 86% of its total transactions are now electronic (Commonwealth Bank of Australia 2002).

Although banking is the most visible change in this process, it spreads across a wide range of industries. Bill paying and airline ticket purchasing are other prominent examples.

The wholesale and retail trade industries have also undergone a particularly large revolution. The Productivity Commission (Johnston et al. 2000) notes that better inventory management tools, such as barcoders and scanners, have transformed wholesaling. Some distribution systems have evolved to the point where a sale from a retailer can generate a real time order to the manufacturer. This has led to a reduced need to hold inventories locally and therefore contributed to greater centralisation.

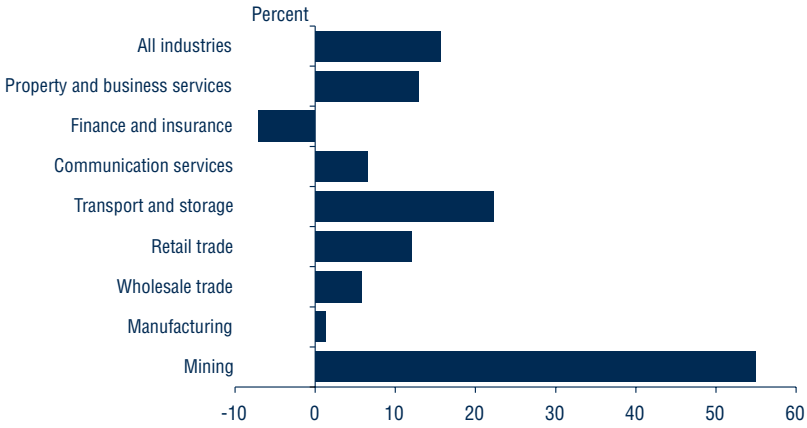
Although these technologies are very new and 'high-tech', they are really just modern examples of a decline in transport and communications costs, just as what occurred in the United States in the 19th century. They have reduced transport costs relative to fixed costs, further reducing the incentive to undertake production in Western Australia.

Therefore, growth over the past decade or so in Western Australia's 'footloose' industries such as manufacturing,[14] and industries that previously had to be situated locally such as finance and insurance, has been low. Growth in industries that are location specific such as mining and retail trade (internet retailing appears not to be significantly affecting growth in retail trade at this stage) has been high. This is shown in the following chart. For example, the Western Australian mining industry represented 29.6% of total Australian mining in 1989-90, which increased to 45.9% by 2004-05, a rise of 54.9%.

14 Manufacturing investment that did occur appears to be related to resource processing, which has a location specific aspect.

Growth in Western Australian Share of Australian Production

1989-90 to 2004-05



Source: ABS Cat. No. 5220.0.

Note: a value of zero indicates that the Western Australian industry grew at the same rate as the national industry.

These trends do not mean that the welfare of Western Australians has not been enhanced as a result of these technologies. Rather they have resulted lower prices for consumers, which has allowed Western Australians to consume more than they would otherwise be able to. From a business competitiveness point of view, lower consumer prices also reduce the incentive for employees to seek large wage increases. This makes Western Australia's export-orientated industries more competitive, enhancing the investment prospects for these industries.

Krugman's model does not take into account factors such as tax competitiveness, sovereign risk or lifestyle factors. Nevertheless, the Western Australian economy has developed in a way that is consistent with the model. This suggests that the market size effect is more powerful than these other factors.

4.5 Summary

The relatively small size of the Western Australian economy has been an important determinant of the State's industry structure.

Western Australia's reliance on location specific industries, which are export orientated and do not require a substantial domestic market, is consistent with the theory that firms subject to significant economies of scale will tend to locate near their largest markets. Firms manufacturing for the domestic market tend to be concentrated in the more populous States of Australia (or overseas).

5. DETERMINANTS OF BUSINESS INVESTMENT IN WESTERN AUSTRALIA

5.1 Introduction

There is no single model of investment that is universally accepted as the definitive and authoritative model. Consequently, this section outlines several well-known economic theories that attempt to explain business investment, and applies them to Western Australia. Broadly speaking, these can be classified as the neoclassical approach, the Keynesian accelerator and Tobin's Q-ratio.

Many theories abound because business investment is a very difficult variable to explain in any quantitative sense. This is because, firstly, investment is derived from the capital stock required to service forecast future demand. Therefore, to analyse investment it is necessary to examine the factors that might influence future demand, and then the implications of this demand for investment.

Secondly, there is a large degree of irreversibility associated with most investment. Companies, which are making 10-20 year plus investments, must be wary of being caught with capital in excess of their requirements if their predictions turn out to be too optimistic. This means that firms might not react in a totally consistent manner to short-term economic conditions.

In the neoclassical model of macroeconomic investment (Chirinko 1993), firms make investment decisions according to the cost of investment relative to its returns. If the marginal product of capital exceeds its cost (at the firm or economy-wide level), then there is incentive to expand the capital stock by investing over and above capital depreciation. Conversely, if its marginal product is less than its cost, then there is an incentive to reduce the capital stock by investing less than current depreciation.

Formally, for the economy-wide model:[15]

$K^* = \alpha Y/c$

Where: K^* is the economy-wide desired real capital stock;
Y is current output (GDP or GSP) in real terms;
c is the real cost of capital; and
α is a technology factor associated with capital productivity.

15 Assumes a simple Cobb-Douglas production function, $Y = K^{\alpha} * L^{(1-\alpha)}$, where L is labour used and $(1-\alpha)$ is a technology factor associated with labour productivity.

Gross investment then equals:

$I_t = K^* - (K_{t-1} - D_t)$

Where: I_t is gross investment at time t
K_t is the existing capital stock at time t; and
D_t is depreciation during the time required to move from K to K*.

In this model, investment is therefore determined by output, the current capital stock, the cost of capital, depreciation and technology/productivity (α). Output in the neoclassical macroeconomic model, however, can be determined simultaneously with investment, so a reduced form of investment can be written as (Scarth, p171):

$I_t = f[W_t/P_t, c_t, \alpha, (1-\alpha)]$

Where: W_t/P_t is the economy-wide real wage, deflated by the economy wide price level, P.

This formulation takes advantage of the similar marginal product condition for labour. It is advantageous to use this formulation rather than just plotting investment and output, as it allows for consideration of what other factors also determine output.

The neoclassical model of investment contains the cost of labour and its productivity ($1-\alpha$). The cost of labour can have two offsetting effects on investment. An increase in the price of labour will decrease overall profitability and hence desired production, causing investment to decline. However, a rise in the price of labour will make it more attractive to use capital rather than labour, increasing investment (Nickel, 1978). The net impact on investment depends on each particular situation.

The macroeconomic formulation above is for the textbook closed economy (no trade or international investment) case, where the same price deflator is used to obtain real value for all variables. For Western Australia, however, given the trade intensity of its economy and the dominance of mining in its investment profile, it makes sense to consider different input and output deflators, in particular for the mining industry. Principally, this involves looking at the specific cost of capital for mining and at the price of its outputs (commodity prices), which will differ from the economy-wide price level (similar to the microeconomic model of Hall and Jorgenson, 1967).

According to the theory, it is best to examine the impact of real prices on investment, so nominal variables are deflated by the Western Australian investment price deflator (ABS, 2004a), although nominal commodity prices are also considered below.

Consideration of an open (trading) economy also raises the question of whether Australian dollar ($A) or $US prices, in which many commodities are expressed in world markets, is more relevant to aggregate investment.

If the $A depreciates, then $A commodity prices will obviously rise (assuming the $US price remains constant). This will increase output revenue for Australian companies, but will increase the cost of imported machinery and equipment. In contrast, $US revenue (for overseas companies) will not change with a depreciation of the $A, nor will the cost of investment goods priced in $US, but the local component (e.g. installation, operating wages) will be cheaper.

The second major theory, the Keynsian accelerator model of investment (Levaãiç and Rebmann, p240), expresses investment as a function of desired output, with the cost of capital or the price level having no effect in this model. Formally:

$K^* = \alpha Y^e$

Where: Y^e is the expected level of future output; and
α is the optimal capital-output ratio.

Gross investment is calculated as shown in the neoclassical model above.

Planned output is driven purely by demand in the Keynsian model, with investment determined by a constant capital-output ratio. This is unlike the neoclassical model, where the capital-output ratio can increase if capital becomes cheaper.

Finally, in Tobin's-Q model of investment (Tobin, 1969) investment is determined by the financial market value of companies relative to the cost of buying capital and creating new companies.

If a company's Q is greater than one, then the stockmarket is prepared to pay more for a company than it costs to buy the same assets and install them, giving the incentive to invest in new assets. If it is less than one, then it is better to buy the company rather than investing in new assets. Aggregated across the stockmarket, the size of Q determines whether investment is strong or weak.

In all models of investment, the replacement of existing fixed capital that has depreciated also determines the level of business investment to some extent. No data, however, are available on depreciation of capital in Western Australia (as no measure of the capital stock exists), and so the impact of depreciation is not considered here.

Rather than deciding upon one theory of investment over another, this paper examines a list of factors from the three theories in a Western Australian context. Some factors, such as the cost of capital, presented complications because measurement at the Western Australian level is very difficult. Nevertheless, data and events relevant to each factor are examined where possible. The factors considered are:

- output;
- commodity prices (in both $A and $US terms);
- cost of capital;
- labour costs and productivity;
- energy prices; and
- industry consolidation.

Output is examined mainly in the Keynesian context, where investment should approximate future output. The commodity prices examined are specific to the mining industry, which accounts for a major proportion of Western Australia's business investment.

Factor costs in the form of the cost of capital and labour costs are also examined, while the industry consolidation that occurred in the 1998 to 2001 investment downturn can be thought of in a Q-ratio context.

Energy prices are also examined in this paper, even though they are usually omitted from the textbook economy model. However, energy is like a primary factor, such as capital and labour, and so should be examined.

A further section on mineral and petroleum exploration is also included, as it forms a major part of current business investment expenditure, as well as providing the mineral deposits that promote investment in the future. Exploration is especially difficult to explain because, while normal investment is a derived demand, exploration takes this a step further, as it is derived is from investment.

While a subsidy to a project will clearly increase the chances of a target project occurring or locating in Western Australia, it is not clear whether this increases aggregate investment. For example, a tax concession granted to a particular industry might mean that taxes on other industries have to be increased, or scarce skilled labour is diverted from one industry to another. Whether any individual subsidy increases aggregate investment requires a complex case-by-case analysis regardless of what stage business investment cycle is at. As this paper is concerned more with the factors that influence the cycle, it does not deal with the impact of subsidies.

5.2 Domestic Output

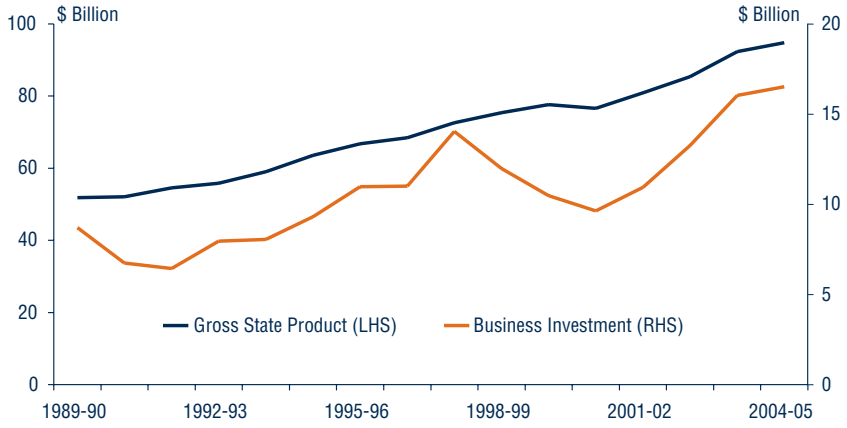
Both the major theories of investment prescribe some role to output, either current or expected, which at the macroeconomic level equates to GDP or GSP. As noted, GSP can be omitted from the neoclassical model because of the simultaneity of investment and output in, but examining output directly is still of interest.

Planned output (in the Keynesian model) is obviously a much more nebulous concept than current output. Unexpected events such as the Asian financial crisis, can lead to the final level of output being different from that originally expected. Nevertheless, over time, the level of output should more or less reflect the level of capital put in place through investment.

The chart below shows GSP and business investment in Western Australia over the past 15 years. It shows that, while both series trend upwards over time, the upward path of Western Australian GSP has been relatively stable, but business investment is extremely cyclical.

Gross State Product and Business Investment

Western Australia, Real (Constant Price)



Source: ABS Cat No. 5220.0.

While there is no reason why investment and output should align every year, as investment relates to future, not current, output, the swings are still large. The 1991 recession and the 1997-98 business investment boom illustrate the potential divergence between investment and output.

Firstly, in the 1991 recession, investment fell by a cumulative 26.2% from 1989-90 to 1991-92. GSP, however, kept growing solidly throughout this period.

This indicates that, even at the reduced levels of investment, the capital stock of Western Australia continued to grow (i.e. investment must have still exceeded depreciation), and/or existing capital became more productive. Alternatively, it could be a timing issue, with increases in exports occurring due to capital installed in previous periods.

In 1997-98, investment surged 27.7% in a single year, but output did not correspond accordingly. This should have added greatly to the productive capital stock, assuming that this investment did not simply replace other large projects than went offline at the time.

The associated increase in the State's capital stock should have resulted in strong export, and hence GSP, growth immediately following. Indeed, GSP grew by 7.0% (and real exports rose by a total of 9.1%) over the following two years, but this was much slower that the growth over the two years to 1997-98 (8.7% for GSP, 14.7% for exports), despite investment growing by a similar amount in the two preceding periods.

This indicates that the newly installed capacity may have been under utilised to some extent. As such, the subsequent increase in GSP was less than if that export demand had not fallen. Pritchard (1996) illustrates this difference between investment effort and effective capital accumulation in a public investment context.

Despite very high $A commodity prices (in nominal and real terms), real exports declined by 0.9% during 2000-01 and rose by only 1.5% in 2001-02. This indicates that the lack of investment in the period from 1998-99 to 2000-01 may have diminished Western Australia's ability to increase exports (although the slowing world economy was also a factor in the decline in exports).

The current business investment boom has yet to push GSP off its relatively smooth upwards path. If, however, the capital is installed wisely, the 70% increase in business investment over the four years to 2004-05 is likely to see the GSP growth path steepen, at least for a few years.

Despite the cyclicality of investment, both investment and GSP have trended upwards over time, meaning that as the economy gets larger so too does investment. This is consistent with both the Keynesian interpretation of investment, and also the neoclassical model, even though output does not appear in the reduced form equation for investment. This is because:

- while no measure for depreciation at the State level is available, it is reasonable to assume that investment to replace depreciated capital will get larger as the economy gets larger;
- the population of Western Australia has continued to expand, meaning that capital can be constantly added without increasing wages to unsustainable levels.

Consequently, the investment response to other variables should be considered with regard to output. On the available evidence, all other things being equal, real investment in 2003-04 should be greater than in 1989-90. In the following sections of this paper, real business investment is, therefore, measured as a ratio of real GSP (the BI/GSP ratio), so that responses during different time periods are measured against the same base.

5.3 Commodity Prices

The price of output is considered a determinant of investment in most microeconomic theories of investment,[16] which can be extended to macroeconomic theories of investment if the economy is highly trade intensive and its output price deflator differs from its input price deflator. All other things being equal, if the price received for outputs (the price of commodities on the world market for the Western Australian resource sector) increases,[17] then there is an incentive to invest in new capital.

Most commodities produced by Western Australia's resource sector, which accounts for most of the State's business investment, are priced in $US terms on the international market, so it seems reasonable that international investors would assess prices in $US terms when considering investing in new projects.

For Australian investors, movements in the level of the $A vis-à-vis the $US have tended to stabilise $A prices of commodities, with movements in commodity prices (or more generally Australia's terms of trade) being reflected by similar movements in the $A (DTF 2000). The traditional reasoning behind this relationship is that improving commodity prices will increase Australia's exports relative to its imports, improving its current account position.[18]

16 Noting that the Keynesian theory of investment has no microeconomic foundations.
17 While the Keynesian theory of investment has no microeconomic foundations, the increase in commodity prices in the neoclassical model is relative to the cost of installing capital.
18 Although the extent of this will be restricted by overseas ownership of export-producing assets and a rise in real domestic income (RBA, 2005).

Consequently, international demand for the $A to buy our exports will outstrip our demand for foreign currency to purchase imports. The associated rise in the demand for the $A induces its appreciation. Alternatively, a rise in $US commodity prices could cause capital inflow to service new investments, which also increases the demand for the $A.

References to Western Australian commodity prices in this paper refer to the aggregate measure of commodity prices as measured by the Western Australian Treasury Commodity Price Index (WATCPI), compiled by the Department of Treasury and Finance. The WATCPI is comprised of the export-weighted prices of Western Australia's most important commodity exports. It differs from the commonly quoted Reserve Bank of Australia (RBA) Australian Commodity Price Index because Western Australia's exports are made up of a significant quantity of oil (not represented in the Australian index), but no coal, Australia's largest resources export. Liquefied natural gas is also a significantly higher proportion of the WATCPI.

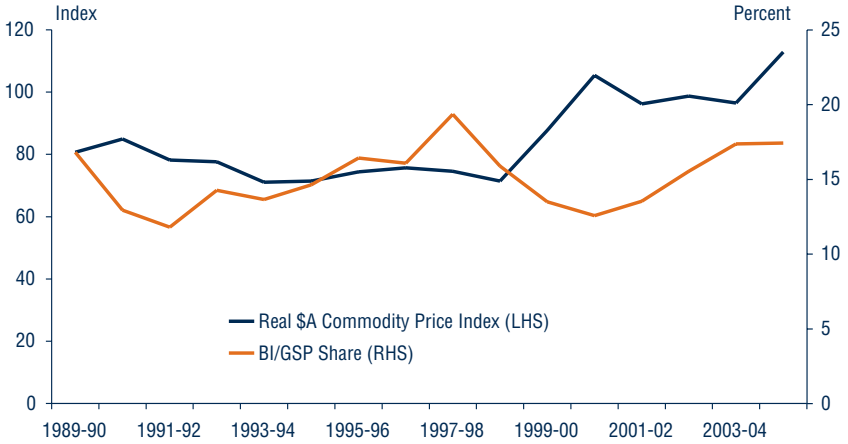
In models of business investment that assign a direct role for prices, investors are said to compare the price of outputs with the price of investing, including the cost of investment goods as measured by the Western Australian business investment deflator.[19] This forms a 'real' commodity price.

19 The other component of the cost of investing or the cost of capital, the required rate of return on capital, is examined in the following section.

The chart below shows, however, that, in historical terms, the relationship between the real $A WATCPI[20] and the BI/GSP[21] ratio is weak at best. For example, investment rose dramatically from 1991-92 to 1997-98, despite stable or falling real commodity prices.

Business Investment to Gross State Product

Share and Real Commodity Prices



Source: DTF, ABS Cat. No. 5220.0.

In contrast, real commodity prices rose dramatically in 1999-2000, driven by increases in nominal $US commodity prices and, somewhat unusually, a depreciation of the $A, but investment did not respond until 2001-02.

In this regard, after remaining very stable for over a decade, the relationship between nominal $US commodity prices and the $A underwent a significant structural change in 1999-2000. The reasons for the structural shift are unclear, but reasons that have been advanced include:

- that the $A moved inversely to the RBA commodity price index, which differs in its composition from the WATCPI. Over the period from December 1998 to June 2000 the price of oil rose from around $11 per barrel to over $30 per barrel. With oil being excluded in the RBA index of commodity prices, the national commodity price index (which is watched by the currency markets) did not rise as much as the WATCPI. Therefore, the level of the $A arguably did not fully reflect, and therefore offset, the increase in Western Australia's commodity prices.

20 The real $US index is exactly the same as the real $A index, as both the numerator (nominal $A commodity prices) and the denominator (nominal $A price of business investment) are divided by the $A/$US exchange rate.

21 The BI/GSP share is used to allow for the fact that investment is expected to increase as the economy grows, and so commodity prices will cause business to fluctuate around an upward trend.

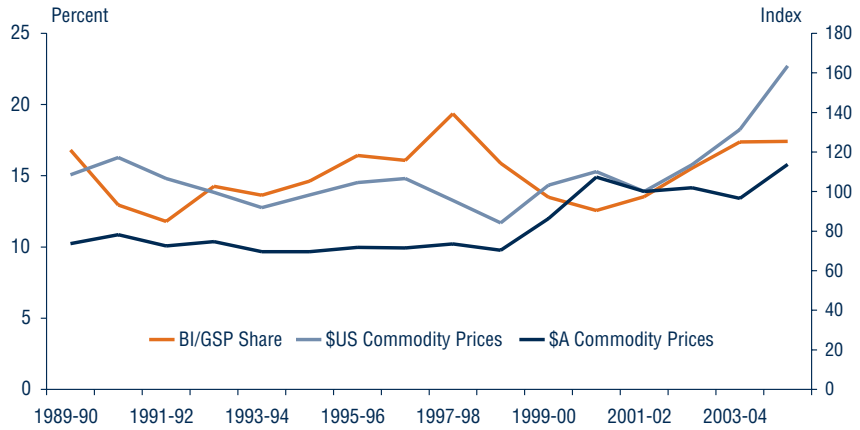
- At this time, the 'tech bubble' in the United States was in full swing. Australia was seen as having an 'old economy' and so its economic prospects were marked down by international investors, leading to a sell off in the currency which saw it fall below $US0.50 in March 2001, despite reasonably sound $US commodity prices. However, despite the bursting of the tech bubble in 2000, the $A did not immediately reflect improving commodity prices until 2003.

The real $A WATCPI rose almost by 50% between 1998-99 and 2000-01 to the highest level on record, but business investment contracted at between 10-20% per annum over that period. Business investment did eventually increase, but not until two years later, and then driven by a project not overly sensitive to prices (the 4th Train of the North West Shelf Project, see below). It was not until 2002-03, when investment in price-sensitive sectors, most notably in the iron ore industry, rose substantially.

While the theory of business investment suggests that investors will compare output prices with the cost of investing (including the rental price of capital which is examined below), it is possible that investors just react to nominal prices. As the following chart shows, there appears to be a moderate positive association between investment and nominal $A and $US prices, although the timing of this relationship has been somewhat variable.

Business Investment to Gross State Product

Share and Nominal Commodity Prices



Source: DTF, ABS Cat. No. 5220.0.

As with the real $A WATCPI, the nominal $A WATCPI does not appear to have any bearing on the business investment cycle, but the nominal $US WATCPI appears to have some influence.

Increasing nominal $US commodity prices coincided with an increase in the intensity of business investment in the Western Australian economy in 1998 and 2003,[22] although the increase in $US commodity prices was much greater in the latter period.

The peak in $US commodity prices preceded the peak of the BI/GSP share in 1998. The BI/GSP share during this period continued to increase until March 1998, even though $US commodity prices peaked in March 1997. It remains to be seen whether investment will continue after the peak of the current commodity price cycle.

One reason why investment might not have responded instantly to falls in commodity prices is because many of the large projects that were undertaken during the 1990s were of such scale that the construction phase extended for a considerable period after starting construction. These projects, once started, generated investment for a considerable period even after international conditions deteriorated. For example, the construction of the $2.8 billion BHP Hot Briquette Iron (HBI) plant in Port Hedland occurred over a 40 month period, from September 1995 to February 1999 (Access Economics 2002).

Business investment declined from 1998-99 to 2000-01, despite the nominal $US WATCPI reaching a very high level in historical terms. Even though nominal $US prices declined in 2000-01, the overall index in June 2001 was still at a level comparable with when investment boomed in 1988 and 1998.

Examining the individual commodities behind the rise in the index can provide some indication of why business investment failed to respond quickly to the strengthening commodity prices after 1999. Most of the increase in the nominal $US WATCPI in 1999-2000 was due to a relatively small number of commodities – oil, liquefied natural gas (LNG), nickel and alumina. Prices of traditional Western Australian staple products such as gold and iron ore were less buoyant.

The largest contributor to the higher $US nominal WATCPI in 1999-2000 was oil. In this regard, the price of Tapis Oil rose from US$19.55 per barrel in July 1999 to US$30.59 per barrel in June 2000. Prices held reasonably firm throughout the next year, with a price of US$28.27 in June 2001.

22 Increasing $US commodity prices also coincided with increasing business investment in 1988, but a BI/GSP share is not available for this period.

This increase in the price of oil led to a large increase in oil exploration expenditure, from A$444.0 million (nominal) in 1999-2000 to A$687.5 million in 2000-01, an increase of 54.8% (ABS 2005c). Discoveries, however, have not been forthcoming at a rapid rate. One industry source consulted in the course of this study noted that if more oil was found, then investment would occur almost immediately, but investment was being limited by the lack of success of the exploration.

The $US price of LNG rose substantially in 1999-2000 and was sustained throughout 2000-01. However, industry representatives noted that the short term price of LNG has very little to do with the investment plans of companies in this industry.

LNG operations have large capital investments and long lives, of around 30 years. Hence LNG producers demand the certainty of long-term supply contracts before they will undertake any investment.[23] The North West Shelf Joint Venture (NWSJV), for example, was not willing to undertake the fourth train expansion of the North West Shelf project until long-term letters of intent for gas supply were secured.[24]

There are also restrictions on the market share that any supplying region can hold in many Asian markets (where most Western Australian LNG is sold). Industry representatives noted that customers from Asia place a very high priority on diversity of supply. Therefore, if Western Australia has a high share of a certain market, then an increase in demand from that market is very unlikely to be transferred to Western Australian producers, even if Western Australia is very competitive in price terms. An increase in the world price of LNG is not a direct indication that demand for Western Australian LNG has necessarily increased.

The NWSJV started construction of its fourth train expansion in 2001-02, which was the major factor in Western Australian business investment growing for the first time in four years. However, the timing of the investment was mainly due to the fact that the all parts of the project, including marketing, design and finance, were completed at this time, rather than being in response to a spike in commodity prices.

23 A liquid spot market for LNG does not exist.
24 Customers in this industry also demand long-term certainty of supply.

In the case of nickel and alumina, the level of capital investment required to expand the refining process is considerable and so capital expansion plans will tend to be long, drawn-out processes. Hence, short-term price spikes (or falls) are unlikely to change investment plans.

For example only two companies undertake alumina production in Western Australia, and both had recently undertaken major capital expansions when the price of alumina rose. Worsley had just undertaken an A$800 million expansion in 1998-99, while Alcoa invested A$260 million at the Wagerup refinery in the same year (Access Economics 2002). Neither was likely to invest further capital at short notice.

In 2000-01, the $US price of both alumina and nickel fell significantly, removing any price incentive for producers to carry any more capital than they had on hand. However, there has subsequently been a sustained recovery in prices for these commodities, which has only recently been associated with higher investment. For example, Alcoa committed to a major expansion of the Pinjarra alumina refinery expansion in 2003 and is currently investigating the possibility of a $1.5 billion expansion of its Wagerup production facility.

With regard to nickel, technical failures in large-scale laterite projects probably discouraged investment in this industry for some time, until BHP-Billiton approved the $1.5 billion Ravensthorpe nickel project in early 2004.

The recent upswing in commodity prices has been more broadly based, encompassing record price increases for the State's second largest commodity export, iron ore. Large price increases for iron ore have coincided with the substantial rise in business investment in this particular industry, although the capacity expansions in the iron ore sector from 2003 were largely prior to the 71.5% increase in prices achieved during the during negotiations with overseas steel mills for the Japanese financial year beginning on April 1 2005. The full impact on investment from these price rises is probably still to be felt.

In conclusion, only a moderate association between overall commodity prices and Western Australian business investment appears to exist. Historical movements in business investment have been consistent with a positively correlated relationship with commodity price movements of the day. That said, the timing and magnitude of the investment response has been somewhat variable, reflecting the lumpy nature of large-scale projects and the particular commodities that contributed the most to the aggregate commodity price rise.

5.4 Rental Price of Capital

5.4.1 Background

According to the neoclassical theory of investment, the level of investment should be inversely related to the rental price of capital. The rental price of capital consists of two components – the price of capital goods and the cost of capital.[25]

A firm's cost of capital is the rate of return the firm must pay to equity holders and creditors (through interest rates) for them to commit capital to a project. This rate is determined by investors' willingness to defer consumption today for consumption at a future time.

In general terms, the cheaper a firm can access capital, the more attractive is further investment. When a firm's return on capital exceeds its cost of that capital, it indicates that the activities of the firm represent a good investment from it shareholders' perspective. It could also indicate that increasing investment could produce further returns for shareholders in excess of the returns demanded.

However, when the return on capital is below the firm's cost of capital, it indicates that its investments have been poor. The best use of the profits generated by the firm is to distribute them to shareholders, either through dividends or share buybacks.

It follows that examining the cost of capital at the industry or economy-wide level might provide a useful insight into Western Australian business investment (return on capital will be determined by things such as commodity prices and productivity which are examined in other chapters).

If the cost of capital goes up, then a smaller number of potential projects will be able to generate returns in excess of the cost of capital, and investment will decline. Conversely, a decline in the cost of capital should stimulate investment.

The cost of capital goods is also relevant to the firm's investment decision. If the cost of constructing a project increases (e.g. due to increases in materials prices or wages), then, all other things being equal, there will be fewer plants built. In this paper, the price of business investment is the price deflator against which all real variables are compared. For this reason, the nominal cost of capital becomes the real rental price of capital.[26] The impact of an increase in the price of capital goods will impact on investment through a fall in real commodity prices.

25 The two are multiplied together, For example, if the cost of capital is 10% and the price of undertaking an investment is $100, the rental price of capital is $10.

26 Following the example in the footnote above, the real rental price of capital is the nominal rental price of capital divided by the investment price deflator. This is equal to: 10/100 = 10%.

Firms may obtain finance from two sources – equity and debt – and the firm's cost of capital must take both of these into account, depending on the particular mix of debt and equity that the firm uses. The two sources are interrelated, because interest (particularly on riskless government bonds) acts as an opportunity cost for equity capital (see below).

A company obtains equity capital by issuing ownership in the company, either in the private market or via the issue of shares if the company is publicly traded on the stock market, or by retaining past profits (earnings).

Factors that impact upon the cost of equity capital include:

- the returns offered by alternative investments (opportunity cost). This could include interest rates or the performance of property investment. If interest rates are high, a high return on equity capital is needed to convince investors to place their money into equities. This will tend to depress share prices relative to profits obtained;[27]
- tax changes. For example, the removal of accelerated depreciation in 2000 increased the cost of capital to the oil and gas industry (this is dealt with separately in Section 5.4.4 below);
- structural changes. Examples would be the expansion in superannuation over the past 15 years,[28] or the looming retirement of the baby boomers, which has caused an unusually large proportion of the population to invest heavily for retirement. An increasing pool of funds chasing the available profits would decrease the required rate of return, as the return required to delay consumption has diminished; and
- risk. Equities are generally considered more risky than fixed interest investments (bonds) or cash, thus they need to generate a higher level of return. Certain industries or companies (such as exploration) are often considered higher risk than others, therefore they must generate higher returns than the total market to attract investors.

A company can obtain debt finance by borrowing money at a set or variable rate of interest. Debt finance can take the form of a loan from a financial institution or issuing bonds on financial markets.

27 Leading to a low 'price-earnings' ratio. High interest rates will also lead to reduced profits through higher borrowing costs and reduced demand.

28 Superannuation was first inserted into industrial awards in 1986 and the Superannuation Guarantee Levy was introduced in 1992. Superannuation assets grew from $154 billion (nominal) at the time of the introduction of the Superannuation Guarantee Levy in July 1992 to $631 billion in June 2004 (APRA, 2005), an annual growth rate of 12.5%. It is not clear, however, if this displaced other savings and investment in the stockmarket.

The RBA largely determines the level of interest rates in the economy, through its control of 'official' interest rates.[29] The rates at which businesses borrow are also determined by the risk of the company or industry defaulting, as well as the term over which the debt is issued.

Calculating the total cost of capital is a difficult task. Technically, the cost of capital is a 'before the event' concept; a factor that is taken into account before the investment takes place. In technical terms, it is an estimate of the expected return to equity holders and creditors. However, only the historical return to capital can be measured. The two measures may differ if actual returns do not match those expected at the start of a project.

Another complication is that a dividend imputation system[30] operates in Australia, but no aggregate data on imputation credits could be found during the course of this study. Therefore, all data presented below are after company tax but before personal tax. This presents less than the full picture but, as dividend imputation existed for the entire period examined, should not present too many problems for the analysis.

There is also a perverse effect when examining spot market interest rates as a cost of capital. The RBA has often undertaken macroeconomic stabilisation policy by cutting official rates when the economy is weak and investment low. As the lag between the change in interest rates and any investment response is uncertain and difficult to predict, it might appear that a low cost of capital is associated with low investment, which is inconsistent with the hypothesis advanced above.

To consider the full picture on the cost of capital for the mining and resource industry, the weighted average (depending on the share of debt and equity funding employed at the aggregate level) of the costs of debt and equity capital must be considered. No reliable data could be found in this area, so the two are considered seperately. Nevertheless, Minerals Council of Australia (MCA) industry data indicate that the proportion of debt funding for member mining companies increased over the period analysed.

29 The overnight interbank lending rate, although longer-term interest rates do not move perfectly with the indicator rate.

30 Under dividend imputation, shareholders receive a personal tax (franking) credit for tax paid by the company.

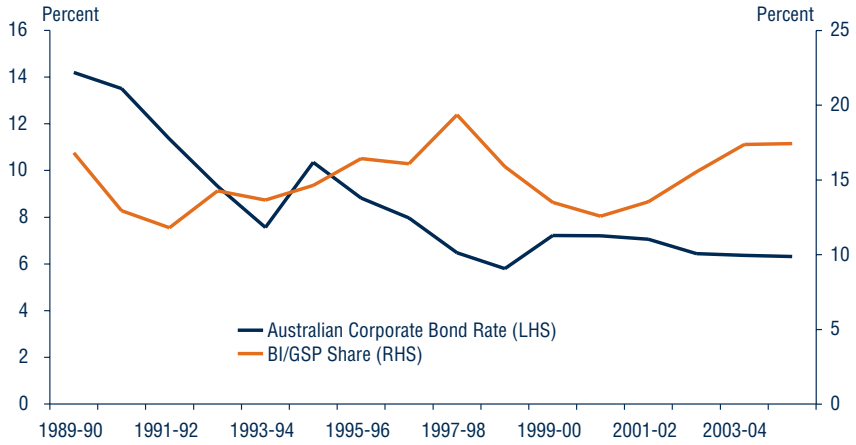
5.4.2 Cost of Debt Capital

Calculating the cost of debt capital is relatively simple, although the appropriate interest rate to use is often not evident.

The Australian Corporate 10-Year Bond Yield Middle Rate was selected for this paper. The capital market is more relevant than bank overdraft rates for investment decisions of mining companies in Western Australia. This is because these investments tend to be high value and have long-term timeframes. Notwithstanding this, it is recognised that short-term debt finance will be important to individual companies from time to time.

The chart below shows the cost of debt capital. Interest rates trended downwards over the entire period shown, creating favourable conditions for increased business investment, and indeed the BI/GSP share (and business investment) grew from 1992 to 1998.

Business Investment to Gross State Product Share and Cost of Debt Capital



Source: DTF, ABS Cat. No. 5220.0, Thomson Financial.

The exception was during the monetary tightening by the RBA in 1994, where the BI/GSP share continued to climb.

Interest rates also rose during 1999 and 2000, which would suggest that the incentive to invest might have diminished to some extent. Investment did fall at this time, but at a greater rate than the level of interest rate change would suggest.

In general, the decline in interest rates from the high levels of the late 1980s created an environment conducive to higher levels of business investment. However, the increase in interest rates from December 1998 is unlikely to be the primary cause of the large decline in business investment from 1997-98 to 2000-01, while the moderate decline in rates sinces does not explain the rapid increase in business investment since 2001-02.

5.4.3 Cost of Equity Capital

Measuring the cost of equity capital is a difficult task (Brunker 1984, page 9), and attempts to estimate the aggregate cost of equity capital during this study were unsuccessful.[31]

As an 'after the event' measure, companies often quote a return on shareholders' funds[32] (ROSF), measured as a percentage, against the total cost of capital. While the available data are not universal in their coverage, it is useful to consider measured ROSF against investment.

A situation in which ROSF is high, but investment low, suggests that investors require a high rate of return to allocate capital to the mining industry, indicating that the cost of capital is high. Conversely, a situation in which investment is very high, but measured ROSF is low, would indicate that capital was freely available, or that the cost of capital is low.

The data used to represent ROSF is found in the MCA publication *Minerals Industry Survey Report* (MCA various). This data set is not universal in its coverage and excludes certain industries, such as the iron ore industry, that are important to Western Australia.[33] Nonetheless, this data set provides a useful insight into the aggregate returns to shareholders generated by the mining industry.

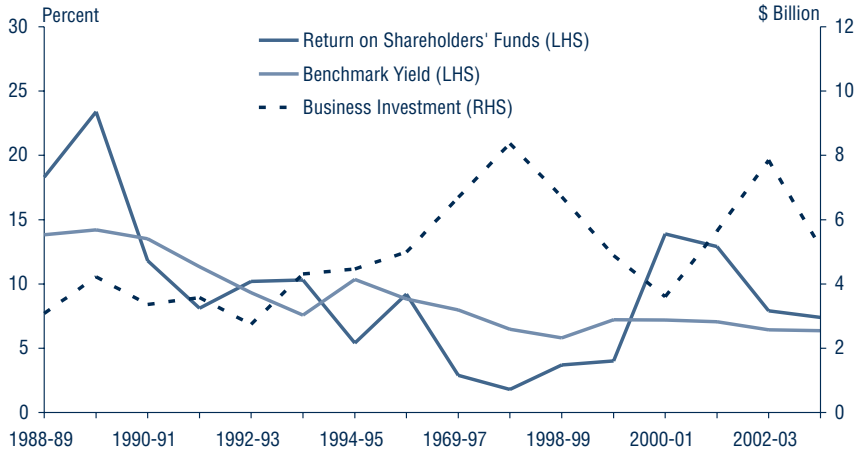
31 Using the capital asset pricing model (Brearly and Myers 1996 p186) and an accumulator series approach (Officer 1994).

32 Sometimes referred to as return on shareholders' equity. Return on shareholders' funds equates to the increase in shareholders' funds over a period plus the dividends paid out by a company over a year, divided by shareholders' funds at the beginning of the year. Shareholders' funds equates to a company's value of assets in excess of its liabilities.

33 Additionally, 2004-05 data were not available.

The chart below shows the ROSF generated by MCA member companies between 1988-89 and 2003-04.[34] Investment by those same companies is also included. This does not exactly track aggregate Western Australian business investment, but it does track outcomes that arise from the conditions facing MCA member companies. The cost of debt capital (as defined in the previous section) is also included to give some context to the scale of the ROSF in each year.

Return on Shareholders' Equity Versus Benchmark Corporate Yield



Source: MCA, Thomson Financial.

During the early part of the sample, ROSF of MCA member companies was extremely high, but investment by these companies, although reaching a peak, was moderate compared to levels reached in future years. During this period, total Western Australian business investment was quite high, indicating that the mining industry (as represented by MCA members) was not the driving force behind aggregate business investment at this time.[35]

While no definitive data could be obtained, this period coincided with a commercial property boom (Simon, 2003), which followed the share market crash of 1987. This combination of booming alternative investments and a risk adverse culture after the share market crash meant that a high ROSF was required to attract capital to the industry.

From 1989-90 to 1992-93, the world recession, and its aftermath, reduced returns to mining companies, which, combined with a presumably low appetite for risk taking, led to investment declining.

34 The MCA data are actually operating profit on average shareholder funds and is only available annually.
35 Mining investment was 49.5% of total Western Australian business investment in 1989-90, which rose to 65.7% by 1997-98 (ABS 2003c).

From 1993-94 onwards, investment by MCA member companies increased strongly, with a rapid acceleration from 1995-96 to 1997-98. This mirrored total Western Australian business investment, even though the MCA sample does not include the industries in which some of the largest investments at the time were made, such as the $2.8 billion BHP HBI plant in Port Hedland.

However, ROSF fell consistently over this period, and was consistently below the cost of debt capital. This suggests that access to equity capital was very cheap, at least when measured after the event. This meant that a larger number of projects could generate returns in excess of the (ex-post) cost of capital.

A possible explanation for the large flow of cheap capital into the mining and resource industry is the large expansion in the Australian share market over the last decade, with the total market capitalisation increasing almost four times between 1991 and 2001 (ASX 2002). As a major component of the Australian share market, at least at the beginning of the period, the mining industry benefited from the additional funds flowing onto the market.

The expansion of superannuation has seen the emergence of large superannuation funds investing in the market, and share ownership by individuals has become more common. The looming retirement of the baby boomer generation might also have been a contributing factor, as the baby boomers, which make up a large share of the Australian population, focussed on saving for retirement, reducing the investment return required to delay consumption.

A second reason for the willingness of investors to place capital into the Australian mining industry for low returns is that, while the expected rate of return required by investors did not change, the actual returns did not match those expected at the time of investing.

Reported company profits in the mining and resources industries were strong at the beginning of the period, giving investors some hope of good returns on capital. On average, MCA member companies generated ROSF of 10.3% in 1993-94 (MCA 2001).[36]

This had however, fallen to 1.8% in the peak of the investment boom in 1997-98. It is difficult to imagine that investors would provide capital willingly for such a low return. Rather, it indicates that the investments did not generate the returns expected of them.

36 The return on shareholders' equity can be defined as total earnings divided by total shareholders' equity.

There is little doubt that investments were made in the mid-1990s that did not result in the profits originally anticipated, particularly in light of commodity price falls associated with the Asian financial crisis in 1997-98 and technical problems encountered with large–scale projects. The BHP HBI plant is the most high profile example of technical problems plaguing a project, but there were many others such as the $1.4 billion Murrin Murrin nickel laterite project and the smaller Bulong and Cawse nickel projects. Several gold mines, such as Telfer, were closed for a time due to low gold prices and declining productivity.[37]

Between 1996-97 and 1999-2000, $5.8 billion in abnormal items was levied against profits of MCA members. The vast majority of these were asset write downs, as expressed by the MCA (1999):

> *For the third consecutive year there were significant write-downs in the value of company assets, particularly in the gold and base metal sectors. Abnormal losses were $2,040 million, compared to $1,301 million in 1997-98. Asset write-downs accounted for most of the abnormal losses.*

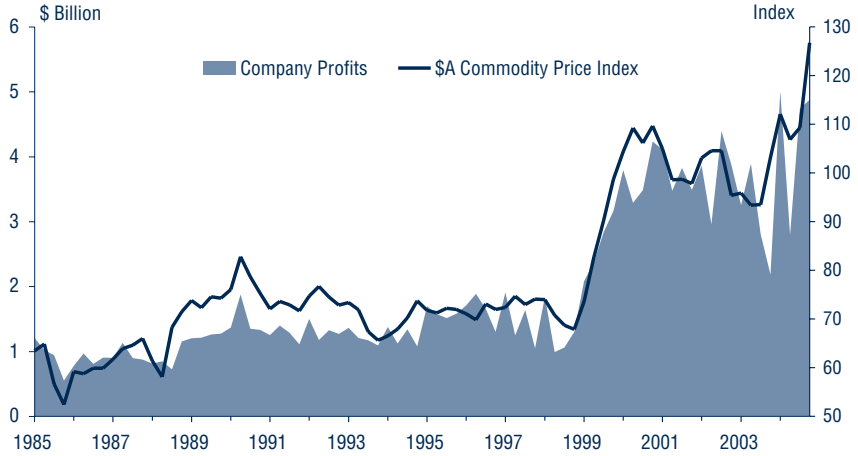
These figures do not include the iron and steel industry, and so the $2.8 billion write-down of the BHP hot briquette iron plant in 1998-99 (Oldfield 2002) is not included in that sum. It is also worth noting that the published ROSF data are calculated on operating profit before abnormal items (including asset write-downs), so these write-downs would lead to even lower returns to capital.

37 The Telfer mine has since reopened.

The chart below shows that, since 1998-99, returns to the mining industry have improved considerably, with company profits increasing to record levels, although measured ROSF did not reach the levels of the late 1980s, reflecting a higher capital base.[38]

Australian Mining Industry Profits

Current Prices



Source: DTF, ABS Cat. No. 5651.0.

This increase in profitability was largely due to record $A commodity prices associated with the breakdown of the nexus between $A and $US commodity prices (examined in Section 5.3.1). Concurrent with the increase in profitability, business investment (and exploration) declined until 2001-02.

The lack of any investment response in 1999-2000 and 2000-01 could be partly (in addition to the reasons outlined in Section 5.3.1) because the mining industry had to demonstrate greater financial discipline (to generate greater shareholder returns) than previously to attract capital.

Despite the increase in the total size of the Australian sharemarket, there is now a greater choice of investments available to Australians than 10 years ago. The resources sector as a proportion of total sharemarket capitalisation had fallen to only 14% by December 2000 (ASX 2002), compared to 37% in December 1990. The mining sector now has to offer higher returns to attract capital from an increasing number of alternatives. The partial float of Telstra in November 1997 might have also diverted some capital away from the mining and resource sector.

38 The use of two different data sets might also affect this result.

The 'dot-com' boom of 1999-2000, when capital flowed freely into just about any high technology company, particularly in the United States, was also a significant factor in forcing the mining industry to increase returns (as the commercial property boom had in the late 1980s). In particular, highly speculative capital that may previously have gone into exploration was diverted to the technology sector.[39]

Cutting investment (except exploration, which can be deducted against current expenses) will not increase short-term profits. Nevertheless, a number of mining companies appear to have reorganised priorities away from immediately reinvesting returns in exploration and new projects and towards increasing profits and dividends. New investment has to be justified to a much greater degree than in the past. Two statements from the BHP 1999 Annual Review (BHP, 1999) highlight this trend.

> *We are moving away from a culture centred on scale, growth and a preference for owning and operating assets, to one where the central focus is shareholder value. We want to increase earnings per share rather than just grow the company in absolute terms. What matters to us are measures such as efficiency, return on investment and value creation* (Page 12).
>
> *Above all, capital will be tested against the ultimate alternative – share buy-back* (Page 11).

The result was that most companies became extremely cautious in allocating capital to exploration and investment in preference to returning it to shareholders in the form of dividends or securing an existing resource through a company takeover.

In 2001-02, business investment in Western Australia increased for the first time in three years. This coincided with demand exceeding current productive capacity (particularly in the North West Shelf project) and the bursting of the 'dot-com' sharemarket bubble in April 2000, reducing the competition for equity capital.

Business investment strengthened further in 2002-03 and 2003-04, on the back of further large-scale resource projects to service growing demand from China. This had some impact on commodity prices on the output side of the investment decision, but it also meant that the resource sector was again 'fashionable' in the investment community. While no measure is available, it would seem likely that the availability of funds to the resource sector increased, and the required rate of return on capital is likely to have fallen.

39 Indeed, some Western Australian companies previously undertaking exploration activities shifted into the technology sector at this time.

5.4.4 Taxation and Accelerated Depreciation

Accelerated depreciation of long-life assets was introduced with the federal Government's *One Nation* economic statement of 26 February 1992. Accelerated depreciation allowed companies to depreciate the assets of a project faster than the actual rate of decline of the asset's usefulness. This allowed a greater tax deduction in the earlier stages of a project's life, effectively increasing the net present value of a project.

Accelerated depreciation (especially in the absence of any franking credits) will lower the cost of capital for the industry or industries to which it applies. This is because the company will pay less tax in the early stages of a project, freeing up cash for distribution to shareholders or reinvestment.

Accelerated depreciation was removed in effect from 21 September 1999 (except businesses with an annual turnover of less than $1 million, which lost the concession on 1 July 2000) as part of the *A New Tax System* process to fund the reduction in the general company tax rate from 36% to 30%. Resource sector companies and government agencies that regularly deal with industry regard the removal of accelerated depreciation as a significant negative factor for business investment in Western Australia.

For example, Chamber of Minerals and Energy of Western Australia Inc. (CME) (1999) noted that:

> *The abolition of accelerated depreciation would increase financing costs, making some new projects unviable. The mooted changes to company taxes would, if introduced, increase the relative attractiveness of mineral taxation regimes in countries which provide investment incentives to the detriment of Australian industry and jobs.*

The importance of accelerated depreciation to a company varies according to the company's circumstances. For example, oil projects often have a life of five years or so before reserves run out, and so accelerated depreciation is of less value than for longer-life projects, and is likely to be compensated for by the reduction in the company tax rate.

Natural gas projects, in contrast, can last for up to 30 years, and so the difference between the actual life of the asset and the accelerated life is extremely large. Accelerated depreciation might be critical to the viability of projects in this industry.

The location of the company's shareholders is important in determining the impact of accelerated depreciation. If a company has entirely Australian shareholders, then the value of accelerated depreciation is less than if the company was owned by foreigners, because dividend imputation makes it attractive to distribute a relatively large share of earnings as dividends. Any company tax paid can be distributed to shareholders as a franking credit, reducing their tax on any dividends.

Nevertheless, accelerated depreciation would make reinvesting earnings more attractive relative to distributing dividends, as the opportunity cost of reinvesting earnings is lower with an accelerated depreciation regime in place. This is likely to increase business investment in the resources sector relative to a situation without accelerated depreciation.

Accelerated depreciation is more significant for overseas investors because they cannot use any franking credits gained from company tax paid. Regardless of whether a company chooses to pay earnings as dividends (and issue new equity for future investments) or reinvest retained earnings, the removal of accelerated depreciation will increase that company's cost of capital. Industry representatives and government agencies dealing with the resources industry noted that accelerated depreciation was critical to attracting overseas investment.

The reduction in the general company tax rate from 36% to 30% will compensate industry for the loss of accelerated depreciation to some degree. It should stimulate investment in the non resource sector, as a taxation bias towards the resource sector is removed and capital will move from the resources industry to other industries.

It is not certain how much of this transfer of investment Western Australia can secure. Chapter 4 hypothesises that Western Australia will not attract as much investment in non-location specific industries as the larger States, and so Western Australia is likely to be a net loser from the removal of accelerated depreciation.

One industry representative described the removal of accelerated depreciation as a 'sleeper', in that the downturn in business investment since 1997-98 for the reasons described in previous sections meant that the impact of the removal of accelerated depreciation had been low. As conditions become more favourable for investment in the resource sector, the extra cost imposed by the removal of accelerated depreciation may cause the curtailment of some projects.

During the recent upturn in investment, some industries, such as most mineral industries, seem not to have been greatly affected by the removal of accelerated depreciation. However, new offshore gas projects remain very difficult to get off the ground, with the North West Shelf area remaining the State's sole production area at the time of writing.

5.5. Labour Costs and Productivity

5.5.1 Background

From a theoretical perspective, labour market variables can impact upon business investment in two offsetting ways. First, unless they can be passed on to customers, higher labour costs will lead to lower profitability of a business, lower desired output and hence a lower stock of capital (the output effect).

Second, at least in the neoclassical interpretation of business investment, the higher labour costs are, the more incentive exists to substitute capital for labour in the production process (the substitution effect). That is, to increase the firm's capital-labour ratio at any given production level, which will tend to increase capital investment.[40] The net impact of higher labour costs on investment and output depends on the relative scale of each effect.

The productivity of the labour utilised is also important for the capital intensive Western Australian mining industry. If capital and labour can be used more productively than previously, then the incentive to invest is greater.

5.5.2 The Western Australian Experience

Real wages growth and the BI/GSP share are shown in the chart below. Two measures of wage levels for the Western Australian economy are shown. Average weekly earnings (AWE) represent average gross (before tax) earnings of employees and do not relate to average award rates nor to the earnings of the 'average person'. Average weekly ordinary time earnings (AWOTE) refers to one week's (before tax) earnings of employees for the reference period attributable to award, standard or agreed hours of work.[41]

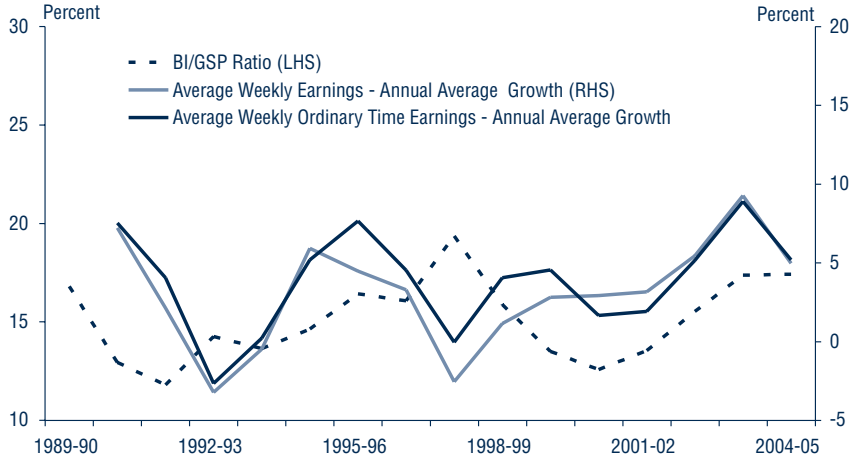
40 A vast literature exists on whether firms' capital-labour ratio can be changed before or after investment decisions, with the evidence mixed. Nevertheless, industry consultation revealed labour costs as critical factors in investment decisions.

41 Both measures have received much criticism over their validity and the Western Australian Department of Treasury and Finance has moved to the newer Labour Price Index (LPI) as its preferred measure for wages in most publications. However, a time series history of the LPI long enough for the purposes of this paper is not available, and so AWE and AWOTE are presented.

The chart shows that there appears to be no causal impact of growth in real wages on business investment, especially when full-time earnings without overtime (AWOTE) are considered.

Real Western Australian Wage Cost

Measures and BI/GSP Share



Source: ABS Cat. No.6302.0, ABS Cat. No. 5220.0.

If anything, wages measures seem to move in concert with the strength of the investment cycle. This suggests that wages growth is largely affected by business investment, rather than the other way around. In particular, high wage growth since 2002-03 has been a function of shortages in skilled labour combined with very strong growth in business investment.

Table 5.1: Private Sector Average Weekly Earnings by Industry, Western Australia, May 2004

Industry	Average Wage Level
Mining	**$1,527**
Construction	$1,148
Transport and Storage	$1,033
Finance and Insurance	$953
Industry Average	**$947**
Communication Services	$939
Property and Business Services	$838
Wholesale Trade	$807
Accommodation, Cafes and Restaurants	$721
Retail Trade	$692

Source: ABS, Special data request - Employee Earnings and Hours Survey.

As noted above, productivity of labour is just as important as the level of wages in determining whether labour costs are acting as an incentive or disincentive to invest.

A high level of wages in an industry usually implies a high level of productivity. In this regard, companies in the mining industry, which accounts for a large share of the State's businesses investment, pay relatively high wages compared with other industries in Western Australia. Table 5.1 above shows that earnings per mining sector employee were much greater than the State average in May 2004.

Industry representatives contacted in the course of this study said that the introduction of more flexible working practices over the last decade was critical in the expansion of the mining industry in the 1990s. Multi skilling of workers and flexible shift schedules are examples of improved work practices cited by industry (CME 2001).

Improved productivity allows mineral and petroleum deposits that were previously uneconomic to be exploited, or to allow previously economic deposits to be exploited at an even lower cost. It is impossible to separate the contribution of capital and labour to increased output, so a measure of total factor productivity is required. This, however, requires a measure of the Western Australian (or Western Australian mining industry) capital stock, which, as noted above, is not available.

Nevertheless, the Productivity Commission has published productivity estimates at the national level for each industry. Given Western Australia's large share of the Australian mining industry, national mining industry productivity should be a reasonable approximation of developments at the State level.

Table 5.2 shows that productivity growth in the Australian mining industry was well above the market sector from 1984-85 to 1993-94, which coincides with the greatest changes in working practices in the industry[42] (although technological gains were also a likely contributing factor).

Table 5.2: Multi-factor Productivity Estimates for Selected Australian Industries, Percentage Change Per Annum

	1984-85 to 1988-89	1998-89 to 1993-94	1993-94 to 1998-99	1998-99 to 2001-02
Mining	2.4	2.3	0.1	3.0
Market Sector	0.4	0.7	1.8	0.5

Source: Cobbold and Kulys (2003).

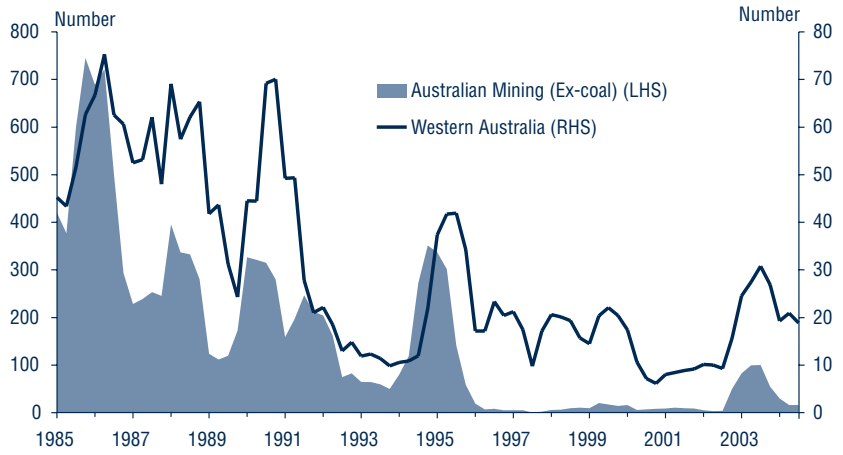
42 The capital-intensive nature of mining means that improvements in working practices will have very large output effects.

In the period from 1993-94 until 1998-99 however, the rate of productivity gain in the Australian mining industry declined from its previous level and trailed that in the total market sector of the Australian economy. There may be several reasons behind this (in addition to the fact that pure technological gains may have been less impressive than previously).

Firstly, relative industrial harmony was achieved throughout the late 1980s and 1990s compared with past periods. The chart below shows the number of days lost per 1,000 employees over each 12 month period for Western Australia and the Australian mining industry (minus coal). Clearly, the trend in number of days lost has declined over the last 20 years.

Days Lost per 1000 Employees

12 Months Ended



Source: ABS Cat. No. 6321.0

However, although the level of industrial disputes in the Australian mining industry was at an exceptionally low level, it had reached close to its lower limit, and so lowering the level of industrial disputes could not be used to further improve industry productivity.

Secondly, the period to 1998-99 coincided with the Asian financial crisis and technical failures in several large projects (such as the HBI plant and the Murrin Murrin nickel project), which meant that these projects never reached their planned levels of output. These factors could have reduced output significantly to what was planned from the installed capital.

5.6 Energy Costs

Energy is an essential input to all businesses and represents a significant cost for downstream processing in the resource industry. A report commissioned by the Business Council of Australia found that energy costs can account for as much as 20% of total production costs of chemical and mineral processing (Port Jackson Partners 2000, page 1).

Given the State's strong resource endowments, globally competitive energy prices are important in attracting and retaining investment in extractive and value adding industries.

Over the past decade, the public monopolies that supplied Western Australia's energy market, have gradually been reformed to enhance the efficiency and quality of energy provision. This process essentially began in 1995, when the Government created separate electricity and gas utilities from the former State Energy Commission of Western Australia (SECWA). The resulting government-owned corporatised entities, Western Power and AlintaGas, were given clear commercial mandates with a view to introducing further reforms as part of National Competition Policy.

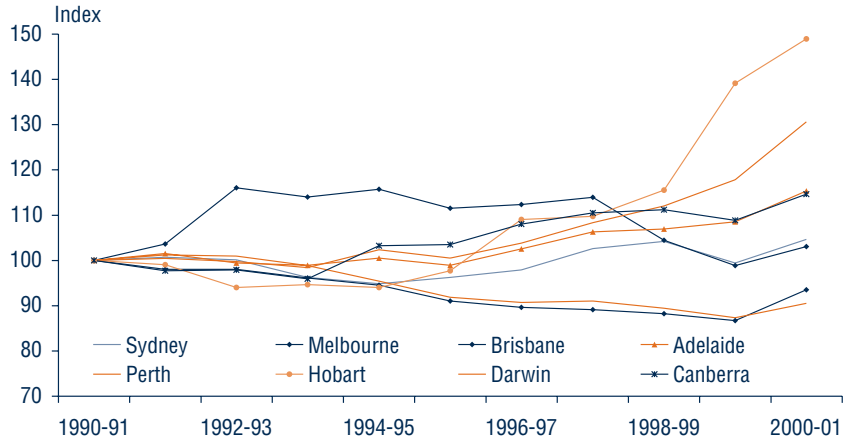
Since 1995, Western Australia has implemented reform initiatives in the gas and electricity industry to develop a more competitive market. These reforms have included introducing competitive neutrality between public and private providers, implementing structural reform and providing third party access to essential infrastructure.

The reforms have delivered savings and improved services to businesses and households. There is significant evidence to indicate that, where they have been fully implemented, the reforms have improved service provision and led to lower energy prices (Productivity Commission 1999, page 131).

Price information for industrial use natural gas is generally not publicly available due to the confidential nature of bilateral contracts. However, there is significant evidence to suggest that Western Australia enjoys a competitive position in relation to industrial use natural gas prices. While not directly comparable to industrial prices, household tariffs may provide some insight into industrial price movements. The following chart illustrates the movement in real residential natural gas prices since 1991 across Australian Sates and Territories (Productivity Commission 2002). The data reveal that since 1990-91 residential natural gas prices in Western Australia have steadily declined, reaching the lowest price level in Australia by 2000-01. Furthermore Western Australia is the only jurisdiction, besides Queensland, where 2000-01 prices were lower than those recorded in 1990-91.

Real Gas Price Trends

Metropolitan Households – Index 1990-01=100



Source: Productivity Commission 2002: 77-81.

In relation to business tariffs, both small and medium metropolitan businesses in Western Australia were paying prices for gas 3.8% and 0.9% lower in 2000 01 than they were ten years earlier in 1990-91.

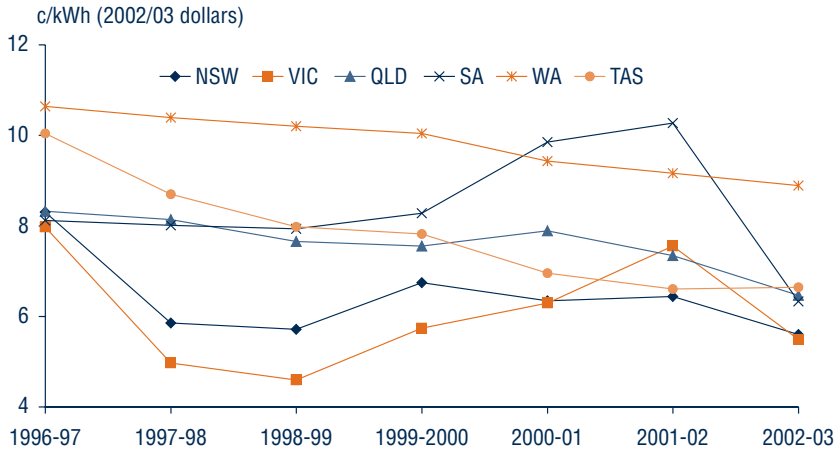
As illustrated by the following chart, despite the reforms to date, the price of electricity in Western Australia remains significantly above the national average, although it has fallen substantially since access to the transmission system was deregulated in 1997.[43] It is important to note that the price of electricity is not directly comparable across States because of the unique circumstances facing Western Australia, such as the size and geographic isolation of the State.

In relation to global electricity prices, there are no comparative statistics available to assess Western Australia's position. However, a general indication of the State's price competitiveness can be taken from comparing the average Australian price for large-volume users, which was 23.5% below the average international price of electricity in 1999 (Port Jackson Partners 2000, page 7).

43 The decline in real electricity prices for business is likely to be greater than that indicated above because the figure presents standard commercial prices and does not include prices negotiated by business directly with electricity providers, which are likely to have declined further.

Large Business Real Electricity

Prices by State



Source: ESAA.

Note: 2002-03 prices are projected price paths based on industry information.

The two main reasons for higher electricity prices in Western Australia are high generation costs, which are influenced by the price of fuel (Electricity Reform Task Force 2001, page 7) and more extensive electricity reforms in other States. Higher electricity costs are a negative for investment in Western Australia compared with the rest of Australia, particularly for large mineral processing projects such as aluminium smelting.

In light of this position, the Western Australian Government embarked on a significant reform process for the electricity industry and market. This commenced with the establishment of the Electricity reform Task Force in 2001.

Significant progress in implementing reforms has already been made, with the establishment of an access code and licensing regime, development of a wholesale market, establishment of on Independent Market Operator and Parliamentary approval for the disaggregation of Western Power. It is expected that this disaggregation will occur from April 2006, and the new wholesale arrangements will come into effect from July 2006.

The reform will encourage increased private sector participation in the market, a more competitive market environment and more competitive electricity prices.

5.7 Industry Consolidation

Takeovers of, and mergers between, Australian and foreign resource companies have been very prominent in the media over recent years. Examples include the Rio Tinto takeover of North Limited, the BHP Billiton merger, Shell's (unsuccessful) bid for Woodside and the Newmont takeover of Normandy mining.

Company takeovers involve the transfer of wealth from one party to another (although the State may collect tax on the transaction). No new economic activity is generated from this process, although the old shareholders of a company can reinvest or spend their proceeds. Nevertheless, takeovers consume the capital of the predator company that might otherwise be used for new investment.

Tobin (1969) formalised the notion of the Q-ratio (originally advanced by Keynes) that new investment will only occur when the cost of starting a new operation is less than acquiring a similar operation through a takeover on the stock market. No formal calculation of a Q-ratio was undertaken for this study due to data limitations and the disappointing performance of the Q ratio in predicting investment in the literature (Oliner, Rudebusch and Sichel, 1995).

Today, however, 'Globalisation' is often the reason given for this trend, which the CME (1999) notes can manifest itself in the form of larger companies that are more international in their focus.

The first factor driving companies in their quest to become larger is the desire to gain economies of scale. Rates of return in the mining industry have fallen over the last decade (MCA 2003), so companies look for ways to grow and improve profits. Growing through acquisitions and increasing productivity through scale economies is one method of doing so.

Companies are also looking to improve their strategic position, especially with respect to price negotiations. Much of the productivity gain achieved in the mining industry (and commodities generally) has been passed on to customers, rather than captured as profits.

It was speculated in the media that the motivation for the Rio Tinto takeover of North Limited was to improve its bargaining power with the Japanese steel companies or to better integrate the buying and selling process. By gaining a greater share of Western Australian iron-ore production, Rio Tinto could drive a harder bargain with its customers.

The increase in takeover activity coincided with a decline in exploration and increase in returns to the mining and resource industry. It was noted in Section 5.4.3 that after 1997-98, the mining and resource industry became much more cautious in allocating capital than previously.

Taking over an existing resource base rather than exploring has the advantage of high certainty, rather than risky exploration. In an environment where the mining industry had to deliver rather than promise, takeovers are more attractive than exploring for a new resource.

Additionally, project establishment problems, such as native title and environmental processes, can be avoided by taking over an existing operation.

Recent changes in Australia's taxation laws have also made company takeovers more attractive. Scrip-for-scrip takeovers were reintroduced as part of the tax reform process for transactions occurring on or after 10 December 1999. A scrip-for-scrip takeover occurs when the predator company offers shares in the proposed expanded entity to shareholders of the company being taken over as payment for their original equity.

Prior to this change in tax treatment, the shareholders of the company would have been liable for capital gains tax on the 'sale' of their holdings, just as would be the case under a cash offer. However, the new tax treatment means that these shareholders can take equity in the new entity without incurring tax, making this a much more attractive proposition. This might have encouraged more mergers, as the cost of a takeover relative to new investment would have fallen (implying a fall in the Q-ratio). Ernst and Young (2001) noted that scrip for scrip takeovers made up over 25% (and 51% by value) of all takeovers 2000 the previous year, up from 9% two years previously.

The level of the $A/$US exchange rate could also have been a factor in an increasing number of takeovers. The weak dollar that prevailed until 2003 would have made Australian companies relatively cheap for foreign companies if the weak dollar was not factored into the valuations of the Australian companies.

While the relatively low $A from 1999 to 2003 may have left Australian companies at low values relative to their foreign counterparts, it also would have reduced the cost of setting up new projects in Australia (the $US Western Australian investment price index fell dramatically over this period). This indicates that the depreciation of the $A was not the major factor behind the increase in takeover and merger activity.

Of potentially greater importance was the low valuation applied to Australian mining companies in the stockmarket for much of the period (a relatively low Q–ratio). As noted above, Australian mining companies seemed to lose the confidence of the financial markets due to a series years of below-average returns. With the benefit of hindsight, with improved management and the emergence of China as a major customer, these valuations proved to be quite low. This conceivably contributed to the investment downturn in the mining industry over this period.

5.8 Exploration Expenditure

5.8.1 Background

It is a well-established axiom that exploration is vital to the future health of the Western Australian (or any other) mining industry. The Chamber of Minerals and Energy (1999) notes that:

> *Exploration is often, and correctly, described as the lifeblood of the mining industry. A minerals industry that fails to explore – and explore successfully – has no future.*

Exploration expenditure is a component of business investment, which means a decline in exploration reduces business investment directly (and vice-versa). There are also important indirect links with investment as exploration locates the deposits of minerals, oil and gas that attract investment and production in the future.

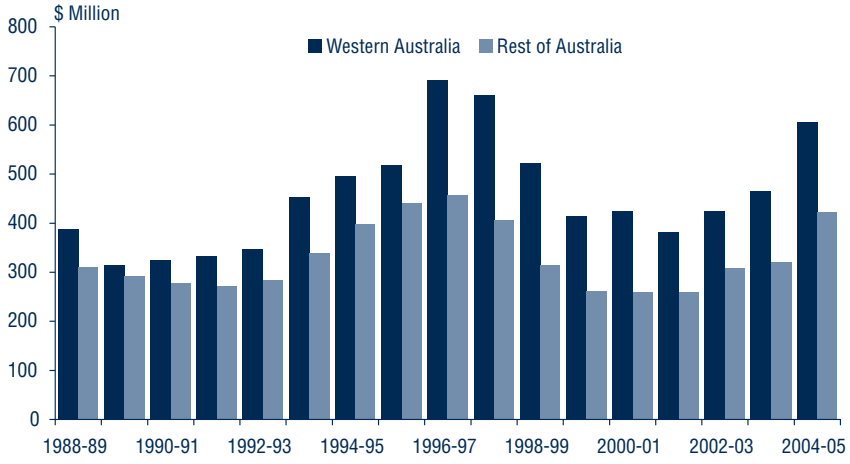
Western Australia attracts most of the exploration expenditure in Australia. Over the past six years (to 2004-05), exploration expenditure (ex petroleum) in Western Australia accounted for approximately 60% of the national total, while petroleum exploration expenditure in Western Australia accounted for approximately 61% of the national total (ABS 2005c).

Total exploration expenditure in Western Australia fell by 22.7% in current price terms from 1996-97 to 2001-02 (ABS 2005c). In particular, exploration for minerals (excluding petroleum), fell by 44.9% in current price terms between 1996-97 and 2001-02, after growing by 107.9% between 1991-92 and 1996-97.

In more recent times, mineral exploration expenditure has recovered, to levels near the 1996-97 peak in current price terms. This, however, does not account for any increases in the cost of undertaking exploration (a suitable deflator is not available), so levels of mineral exploration are still well below the 1996-97 peak.

Exploration Expenditure

Current Prices, Ex-Petroleum



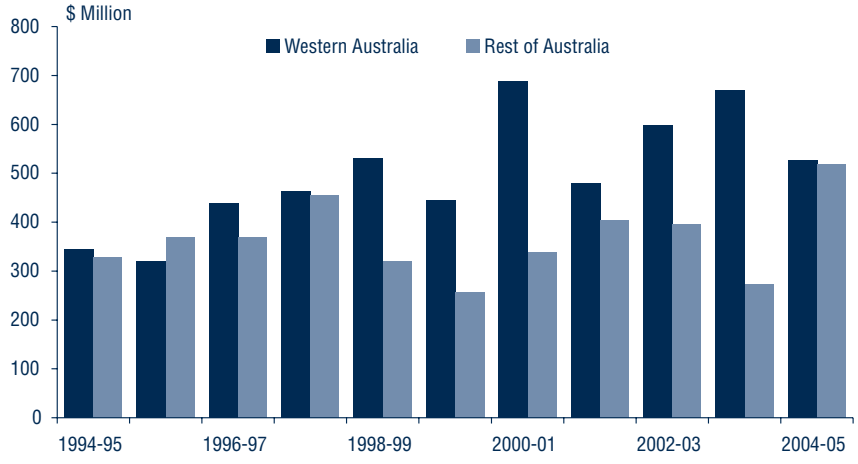
Source: ABS Cat. No. 8412.0.

National exploration expenditure has declined at a similar rate to that in Western Australia over recent years. Mineral exploration expenditure in the rest of Australia fell by 43.2% from 1996-97 to 2002-03.

In contrast, petroleum exploration in Western Australia has risen to levels well above those in the mid-1990s. High oil prices since 1999 have provided a powerful incentive to search for new resources.

Exploration Expenditure

Current Prices, Petroleum



Source: ABS Cat. No. 8412.0.

Industry has also pointed to the trend of an increasing proportion of exploration being undertaken on the leases where known deposits exist, or 'brownfields' exploration, as opposed to 'greenfields' exploration where attempts to identify a new orebody are made. It is safer, it is argued, to explore near existing deposits where the status of the lease is secure, thereby avoiding native title complications. The probability of a discovery is also usually higher than on a pure greenfields lease.[44]

Industry has argued that exploration is being diverted to overseas locations. Easier land access, more prospective regions and less rigorous approvals processes have been cited by industry as reasons for this trend.

5.8.2 Analysis

There have been a number of reasons advanced for the decline in exploration over the five years to 2001-02. Most prominent of industry's complaints has been difficulty in accessing land to explore. In particular, industry claims that the advent of native title has had a significant impact on exploration in Australia.

Individual cases where native title issues have held up and between individual exploration program can be cited, but the key question is whether it is significant at an industry-wide level, or are there other reasons as to why exploration has declined?

In terms of other reasons for the downturn in exploration that have been advanced, Parry (2001) attributed the downward trend in Australian exploration activity to:

- a decline in worldwide mineral exploration over this period. Exploration expenditure in the western world fell by 54% in inflation adjusted $US terms from 1997 to 2000, compared to a 55% decline for Australia;
- poor profitability of the mining industry;
- low commodity prices;
- the deteriorating discovery record of exploration despite increased expenditure;
  - in this regard, the vast majority of profits from a mining district are obtained from the discovery of a huge deposit for relatively little exploration expenditure in the early stages of the district's development. As the districts within Western Australia become mature over time, the efficacy of exploration will decline, and exploration expenditure will be shifted to less mature districts; and
- the competition for high-risk capital offered by 'high tech' companies.

44 Although the chance of discovering a large new ore deposit is less. Unfortunately, no reliable data exist on the relative proportion on greenfields versus brownfields exploration expenditure.

Also of importance could be the commitment of mining companies to shareholder returns mentioned in Section 5.4.3 above. Companies could be subjecting exploration expenditure to much more rigorous analysis before deciding whether to commit previous periods profits to exploration expenditure, rather than (for example) paying higher dividends.

In this regard, rather than being the basis for comparison, it is conceivable that the level in 1997-98 was above what was sensible in response to market conditions at the time.

Additionally, under Australian taxation law, exploration can be immediately expensed, so a quick way to increase short-run profits is to cut exploration expenditure. In the environment in the late 1990s when the mining industry attempted to regain the confidence of financial markets by increasing profitability, this could have been one course of action to raise profits.

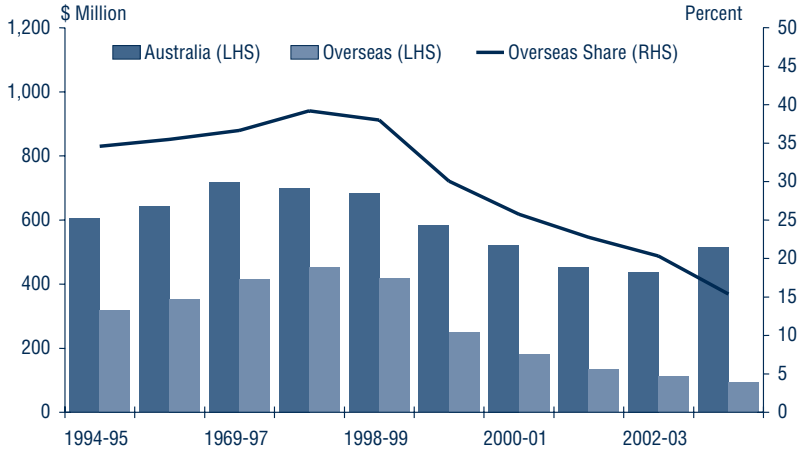
If this is the case, this strategy cannot continue forever without profits declining. However, while mineral exploration has turned upwards recently, it has not returned to its previous level. This indicates that companies may be happy with their current mineral reserves for the time being. The one area where exploration has been very strong recently, petroleum, is the industry where reserves often have the shortest life span.

Some industry representative noted that mining companies, both Australian and international, were spending a greater proportion of their exploration budgets in regions other than Australia due to the problems with land access.

Data on the proportion of exploration expenditure spent overseas are limited, but the annual survey by the MCA (MCA 2004), in which its members are asked to split their exploration expenditure into that spent in Australia and overseas, is useful. The chart below shows that there was a small upward trend in the share of exploration expenditure spent overseas until 1998-99. This declined dramatically until 2002-03, where there was a slightly increase in the proportion of overseas exploration by Australian firms.

MCA Member Exploration Expenditure

Australia and Overseas, Current Prices



Source: Minerals Council of Australia (Various)

Nevertheless, it is probably inevitable that, in an increasingly globalised world, a greater share of the exploration budgets of Australian mining companies will be spent overseas. Manning (1997) noted that in 1994 Australia attracted 21.5% of world metals exploration expenditure, despite Australia accounting for only 6% of the world's landmass. This intensity of exploration would eventually lead to diminishing returns. Manning also argued that the political risk in many developing countries has also fallen over time.

Overall, there are a number of reasons as to why exploration, particularly for minerals, has lagged below levels in the mid-1990s, and it is impossible to precisely identify the largest cause of this decline.

5.9 Summary

Examining individual components of a theoretical model is somewhat dangerous when all components are acting upon business investment simultaneously. While one determinant of business investment might be positive, it might be overwhelmed by other negative factors. Nevertheless, the data suggest some correlation between business investment and the factors economic theory proposes as major determinants.

Evidence on the influence of commodity prices on business investment is inconclusive. In particular, real commodity prices have been very high from 1999-2000 onwards, but business investment declined until 2001-02, and even then this was driven by a commodity (LNG) driven by long-term contracts rather than prices. Prior to 1999-2000, investment and commodity prices, particularly in nominal $US terms, appeared to be positively related.

Conditions in capital markets might well be the most significant factor in explaining business investment. In the mid 1990s, capital (particularly equity capital) was readily available to the mining industry at a low cost, which meant that more projects could generate the return required to attract capital. A tightening in capital market conditions for the mining and resource industry in the late-1990s is consistent with the subsequent decline in investment.

Labour issues, in particular high productivity growth, created a climate very favourable to investment in the early to mid 1990s. Eventually, the rate of improvement declined, which, together with technical failures in large projects and the drop-off in demand from the Asian financial crisis contributed to the environment less favourable to investment than previously.

Overall, the story of business investment in Western Australia since 1990 has been one of extremely favourable conditions in the early to mid-1990s, turning to very unfavourable conditions in the late 1990s. Since that time, strong commodity demand from China has seen a very strong resurgence in business investment.

After the worldwide recession of the early 1990s ended, demand in major overseas markets recovered, which also led to strong commodity prices. Capital was readily available, while wages growth was subdued and labour productivity was strong. Business investment increased at 13.9% per annum from 1991-92 to 1997-98.

However, from 1997-98 onwards, the mining industry was hit by a series of unfavourable conditions. The Asian financial crisis of 1997-98 reduced demand for commodities by Western Australia's major trading partners, depressing nominal $US commodity prices. Mining companies became more careful in allocating capital to meet market demands for higher returns. Although the industrial relations climate remained positive, labour productivity growth declined and wages growth accelerated. Despite high real commodity prices, business investment declined by a total of 31.4% from 1997-98 to 2000-01.

Business investment recovered from 2001-02 to 2003-04, rising by 13.7%, 21.2% and 20.9% respectively, before consolidating with 3.0% growth in 2004-05. This has been a fairly broadly based recovery and can be linked to a resurgence in demand for commodities by Western Australia's major trading partners, especially from China.

A second problem is that changes in commodity prices or the equity market conditions may have swamped the impact of many of the local variables.

Energy costs are significant for highly energy-intensive resource-processing, projects, and cheaper prices would make Western Australia relatively more attractive as an investment destination. While gas prices are competitive, electricity prices remain well above those in the rest of Australia.

Takeover and merger activity in the resource industry may have diverted capital from investment in new projects. The stockmarket valuations of mining companies, rather than the low level of the $A from 2000 to 2003, also made taking over an existing enterprise relatively attractive compared with starting a new project.

The trend in worldwide exploration activity could be attributed to: difficulty in accessing land to explore; poor profitability of the mining industry; low commodity prices; the deteriorating discovery record of exploration despite increased expenditure and; the competition for high-risk capital offered by ‘high tech’ companies.

6. CONCLUSION

Business investment is a larger and more volatile component of the Western Australian economy than of the Australian economy as a whole. This reflects the dominance of the mineral and energy sector in Western Australia, which typically involves a relatively moderate number of high value projects.

Determining the factors that drive business investment in Western Australia is a complex task. There is a multitude of variables that might impact on business investment, and the interaction of these variables means that the impact of any one factor may be difficult to determine.

This paper focuses on the determinants of investment, mainly in the minerals and energy sector, and employs a combination of the economic theory of investment and evidence gained from consultation with Western Australian industry groups.

It appears that business investment in Western Australia has been largely determined by conditions in world capital markets. In particular, the mid 1990s investment boom was consistent with a willingness of markets to finance mining and resource developments at that time, while the subsequent slowdown appeared to be caused by the markets tiring of the low returns achieved by the industry.

More recently, while surging international demand for resources, particularly from China, has supported a strong recovery in the business investment cycle in the mining sector, the end of the tech boom has made access to capital easier.

In contrast, evidence on the relationship between commodity prices and business investment was mixed at best. While investment appears to have a moderate positive association with nominal $US commodity prices, the magnitude and timing of this relationship is affected by the 'lumpy' nature of large-scale projects and the particular commodities that contribute most to the aggregate commodity price changes.

Productivity gains in the 1980s and early 1990s played a key role in the rapid increase in investment in the 1990s. However, there has subsequently been a slowing of growth in productivity, led by: projects operating at a lower than expected capacity; the impact of the Asian financial crisis; and the end of 'easy' productivity gains, such as reducing industrial disputes.

Empirical evidence used to analyse the determinants of the downturn in mineral exploration after 1996-97 is inconclusive. While this paper does not explicitly examine native title, it may have delayed some new projects, but there are a range of other factors that could have been responsible for the decline.

Energy costs, particularly electricity costs, are significant for energy-intensive resource processors, such as aluminium smelting. At this point, Western Australia has relatively high electricity costs compared with the rest of Australia, which might be deterring investment. However, reform of the natural gas industry has placed Western Australia in a very competitive position in terms of attracting projects reliant on gas.

This paper has been prepared to improve the understanding of the issues and interrelationships determining business investment in Western Australia and does not pretend to supply all of the answers.

We hope that it is useful and interesting in that regard.

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