

Deloitte Access Economics

Investment and GDP profile study

Business Council of
Australia

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1 Executive Summary

Mining investment (including oil and gas) has been a major driver of economic growth in Australia in recent years.

But in 2013 the Australian economy is in transition. Mining investment is peaking and will soon start to *detract* from economic growth. Interest rates have been pushed to record lows to help the economy respond, and during May 2013 the \$A has also been giving up ground as well. Fingers are crossed that these mechanisms will help to generate activity in other parts of the Australian economy. However, those mechanisms may take some time, business and consumer confidence is fragile, and governments in Australia may increasingly look to rein in their spending.

That creates **some potential potholes in economic activity going forward**. The extent of these will depend upon the rate at which mining investment does decline from its peak, and the ability of other elements of economic activity to fill the gap, including infrastructure investment.

Mining investment outlook

Mining investment was the equivalent of 7.7% of Australia's GDP at the end of 2012, a stunning rise from 1.5% of GDP a decade ago. However, with commodity prices declining there is definite pressure on the current pipeline of projects. The Bureau of Resources and Energy Economics (BREE) believe that \$150 billion of high value projects at the feasibility stage have been delayed or cancelled since April 2012.

Deloitte Access Economics' view sees mining investment decline to 5.5% of GDP by 2016, falling below 4% of GDP by 2023. In their 2013-14 Budget documents, Federal Treasury see a modest decline in mining investment in 2014-15, with sharper falls over 2015-16 and 2016-17.

The consensus view from the major Australian banks is also gloomy, and includes expectations of a shorter term fall in the value of capital projects in Australia by 2015. Projections from ANZ Bank see mining investment fall to as low as 2% of GDP by 2016.

Exports to rise

Given the high levels of investment achieved in recent years, Australia's capital stock has expanded significantly. This will allow exports to rise over time. From having been a burden on GDP growth in recent years, net exports are expected to contribute around half a percentage point to GDP growth on average per year for the foreseeable future.

Unfortunately, even the shift to higher levels of exports is unlikely to completely fill the vacuum left by falling mining related investment in the short term. As such, **Deloitte Access Economics expects GDP growth to remain below 3% per annum over 2012-13, 2013-14 and 2014-15** (with 3% at the lower bound of 'trend' growth over the past decade).

And this view of GDP growth also factors in a notable lift in housing investment and a pick-up in infrastructure investment – neither of which can necessarily be taken for granted.

Broader investment outlook

There are still many large (mining and other) projects being considered across Australia. The June 2013 *Investment Monitor* reports some \$877.1 billion of projects which are either underway or in planning.

The major project planning pipeline remains large, and offers the country significant potential if the broader macroeconomic and policy environment is supportive.

In terms of infrastructure, there are opportunities to play a supporting role to lifting mining production, including via railways, port projects and electricity. Spending on other elements of infrastructure may track steady rather than achieving growth, though there remains significant potential for improvements across a range of urban infrastructure.

Having recovered from a period of limited investment in the early to mid-2000's, infrastructure investment currently accounts for approximately 4% of GDP. Deloitte Access Economics expects infrastructure investment to average 4.3% of GDP over the next ten years. Over that time, that would amount to a cumulative total of \$767 billion of infrastructure investment in Australia.

However, for a number of these projects to get the go ahead a supportive macroeconomic environment will be required, and particularly in the case of infrastructure, support from government in terms of planning, regulation and financing mechanisms to allow projects to proceed.

That is, **infrastructure investment has the potential to help fill the gap left by declining mining investment** (and make good use of some of the skilled workers who will be leaving mining projects). But this won't necessarily happen automatically. For continued growth in the level of infrastructure investment to actually be achieved, new projects need to be designed, approved, financed and delivered – none of which is an easy task.

Scenario analysis

In an attempt to quantify the impact of varying expectations for mining investment, a scenario analysis was undertaken based on different investment forecasts. The central case projection is drawn from Deloitte Access Economics' forecasts, the lower case scenario is inspired by the more subdued mining investment outlook presented by ANZ, while the higher case still sees some short term decline in mining investment, but then allows it to level out at what would still be a robust share of the economy.

Expected growth for key economic aggregates under these scenarios are presented in Table 1.1.

The broader economic effect of different profiles for mining investment becomes greater as time goes on. In the short run, changes to investment are partially offset by changes to the path of imports (with mining investment seen as being particularly import sensitive), and flow-on effects to interest rate and exchange rate sensitive sectors of the economy.

Table 1.1: Key results, mining investment scenario analysis

	Average growth		Real \$ billion	
	FY13-FY18	FY18-FY23	FY18	FY23
Central case				
GDP	3.1%	3.2%	1,737	2,037
Investment	1.6%	1.2%	304	324
Imports	4.5%	4.7%	403	508
Exports	5.9%	7.2%	440	623
Employment ('000)	1.5%	1.4%	12,478	13,405
High scenario				
GDP	3.2%	3.6%	1,745	2,079
Investment	2.9%	2.6%	324	368
Imports	5.0%	5.1%	413	530
Exports	6.1%	8.2%	444	659
Employment ('000)	1.5%	1.5%	12,493	13,443
Low scenario				
GDP	2.9%	2.6%	1,723	1,954
Investment	-1.8%	2.2%	257	287
Imports	3.2%	5.2%	379	489
Exports	5.6%	4.0%	433	526
Employment ('000)	1.5%	1.5%	12,450	13,387

Source: Deloitte Access Economics

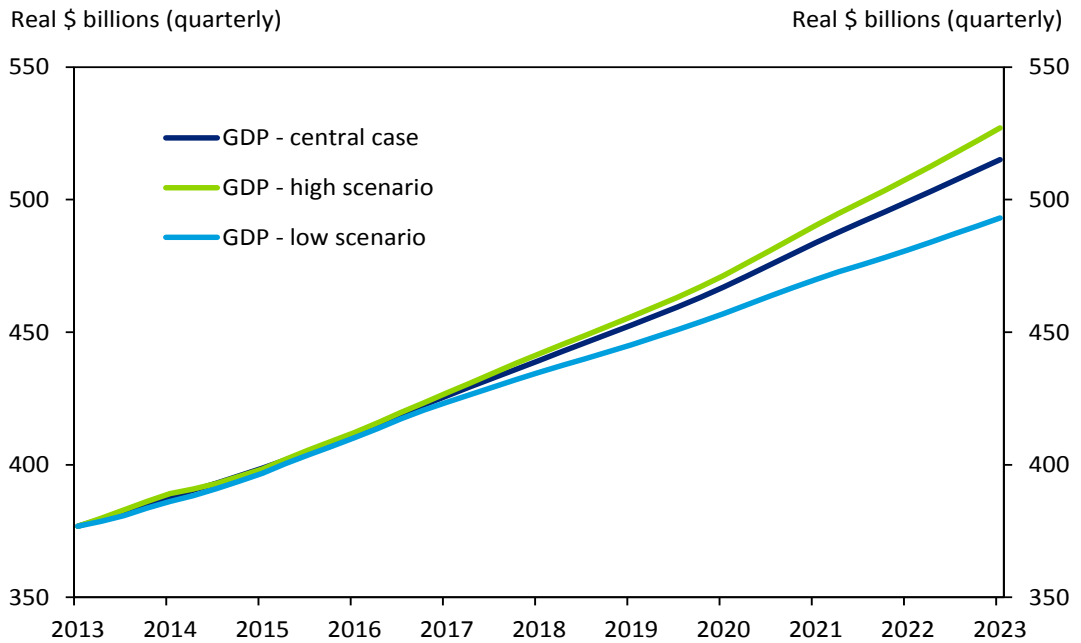
Base year for real units is 2010-11

Over the longer term however, the permanent fall, or rise, in Australia's capital stock does have a significant effect on production capacity. So decisions which are taken on investment now can have long lasting effects on the nation's economic growth potential.

Chart 1.1 shows that the impacts on GDP become very significant over time. By financial year 2023 GDP in the high scenario exceeds the central case by \$43 billion in real terms, while the lower case GDP is \$83 billion less than the central case and \$125 billion less than the higher case in real terms (base year 2010-11).

The changes to the output path also mean notable changes to employment. Under the low scenario, employment falls by 19,000 compared to the central case, and by 56,000 compared to the high case by 2023.

Chart 1.1: Projected GDP profile, mining investment scenario analysis



Source: Deloitte Access Economics
 Base year for real units is 2010-11

The actual path that mining investment takes over the next few years can therefore play a significant role in the nation’s future economic capacity.

All scenarios examined here factor in some reasonable level of decline in mining investment. Filling that gap, at least in part, through other activity such as housing construction and infrastructure investment will be important for Australia’s economic performance over the next few years.

David Rumbens

Deloitte Access Economics

2 Background

Mining¹ related investment is the main driver of Australian economic activity at present. However, as commodity prices fall and cost effective opportunities for further resources expansion recedes, economists believe the contribution of resources investment to economic activity in the near future will moderate.

That begs the question, what is the expected shortfall in GDP over the medium term as a result of the economy's shift away from resources related investment. This will largely depend on the future profile of resources investment, of which opinions are many, and varied: – as described by the Reserve Bank of Australia (RBA) in the May 2013 Statement on Monetary Policy:

“The forecasts for the Australian economy continue to embody a gradual shift in growth from mining investment towards exports, non-mining business investment and household spending. While there are signs that this rebalancing is beginning, there remains considerable uncertainty about how it will proceed. In particular, there remains a large degree of uncertainty surrounding the exact profile for mining investment.”

Source: RBA, Statement on Monetary Policy May 2013

Given the uncertainty surrounding the current economic environment the Business Council of Australia (BCA) seeks an analysis of the Australian economy that would contribute to debate about what might follow the impending peak in resources related investment. Particular attention is given to quantifying the effect on GDP caused by a moderation of investment following the peak of the resources investment boom.

The report presents a description of the macroeconomic environment at present and a discussion of where it may be heading in the future. This includes Deloitte Access Economics' projections, along with views from public institutions and major private financial institutions.

In an attempt to quantify the impact of varying expectations for mining investment, the report features a scenario analysis based on different investment forecasts. The central case projection is based on information from Deloitte Access Economics' *Business Outlook* as well as *Investment Monitor* publications. Alternate investment profiles are also analysed - a lower case and a higher case. The lower case scenario is inspired by the more subdued mining investment outlook presented by ANZ. The higher case still sees some short term decline in mining investment, but then allows it to level out at what would still be a robust share of the economy.

Scenarios are produced using a macro-simulation model of the Australian economy. Key underlying parameters are adjusted to reflect the particular specifications of a mining investment shock. The final results, discussed in Chapter 4, include impacts on GDP as well as major components of GDP.

¹ In the context of this document mining includes oil and gas extraction

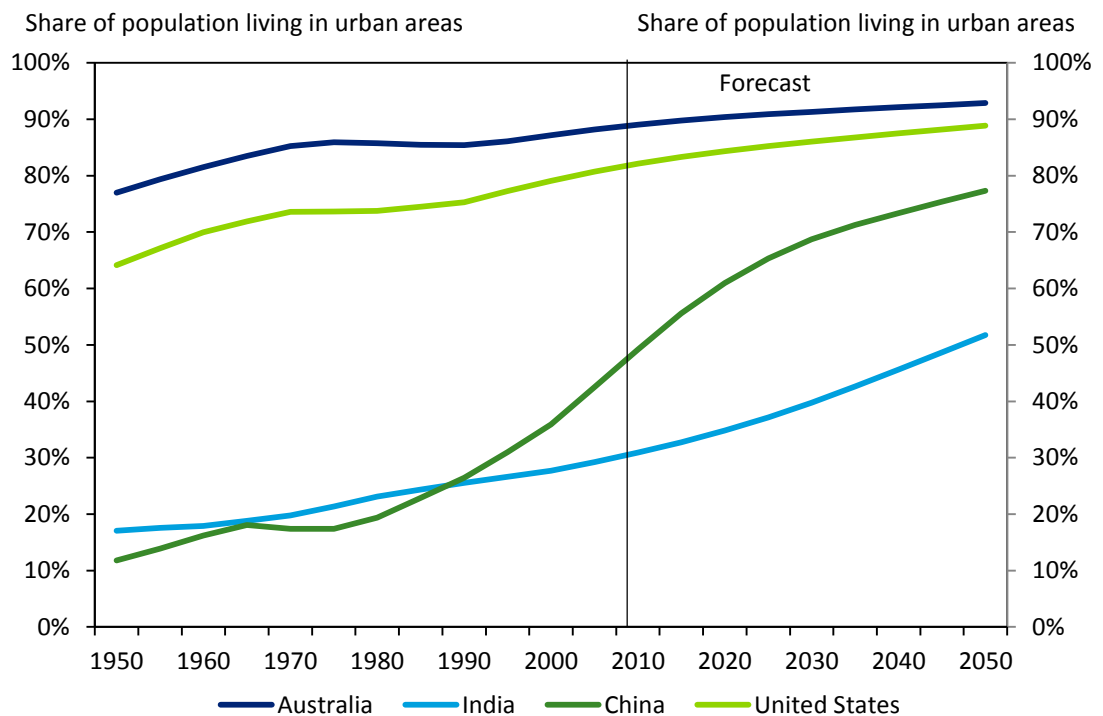
3 Macroeconomic environment

This chapter examines the macroeconomic backdrop that has driven resources related investment in Australia over the past decade. Moreover, expectations for Australia's investment and broader economic prospects are discussed. This includes a discussion of how varying levels of resources related investment, as forecast by the major banks, Federal Treasury, the RBA and Deloitte Access Economics, will affect the level of economic activity in Australia over the coming years.

3.1 The macroeconomic backdrop

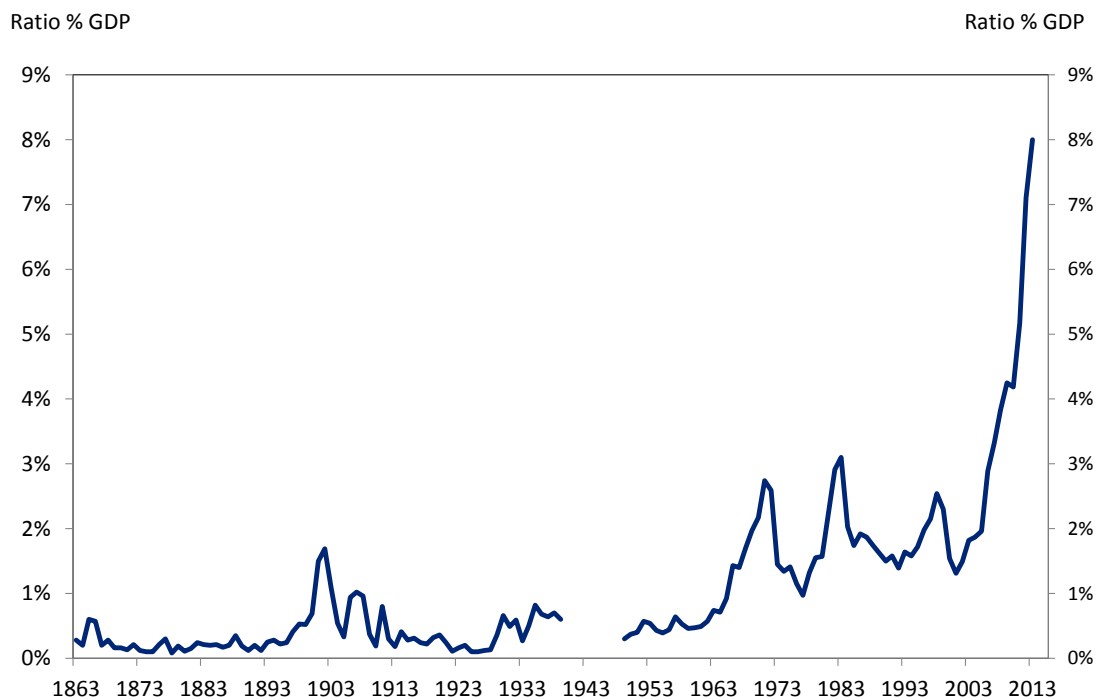
Rapid industrialisation in China and India has been a key driver of global economic growth in the past decade. That trend has dramatically increased these nations' demand for resources as they build the infrastructure necessary to support an urbanising population. Furthermore, as Chart 3.1 illustrates, there is still a long way to go before China and India show the level of urbanisation present in developed nations such as the US and Australia.

Chart 3.1: Urbanisation in China and India



Source: UN World Population Prospects, 2010 revision and UN World Urbanisation Prospects, 2011 revision

The economic emergence of China and India, as well as other Asian countries, has brought a once in a lifetime opportunity to Australia. Demand for industrial and energy commodities such as iron ore, coal and gas has pushed up Australia's terms of trade. In response to the higher prices, an investment boom of historical proportions emerged as illustrated in Chart 3.2.

Chart 3.2: Mining investment as a share of GDP over time

Source: Reserve Bank of Australia

Of course, an all too often forgotten characteristic of any boom is that it is temporary. As such, Australia is on the precipice of a shift in the driver of economic activity from mining investment to mining exports. This shift will present some structural challenges, and it is not clear that it can be undertaken without consequences for the broader rate of economic growth.

3.2 Mining investment

Significant debate surrounds the expected future profile of mining investment. The ABS' capital expenditure survey indicates that mining investment is nearing its peak while other commentators are suggesting that mining investment has already peaked and is facing a sharp decline. While on some measures (such as new project commencements) the peak has already been seen, there still continues to be a very large mining investment pipeline at present, and the long construction periods associated with mining investment mean that many of the current projects underway will continue to be in their construction phase for some time yet.

Nevertheless, there is definite pressure on the current pipeline. While large LNG projects continue to dominate the investment program, the economic parameters underlying these and other mining investments are rapidly weakening. The Bureau of Resources and Energy Economics (BREE) believe that \$150 billion of high value projects at the feasibility stage have been delayed or cancelled since April 2012.

Chart 3.3 illustrates the varying mining investment forecasts presented by Deloitte Access Economics and other financial institutions. There is a considerable amount of variance in

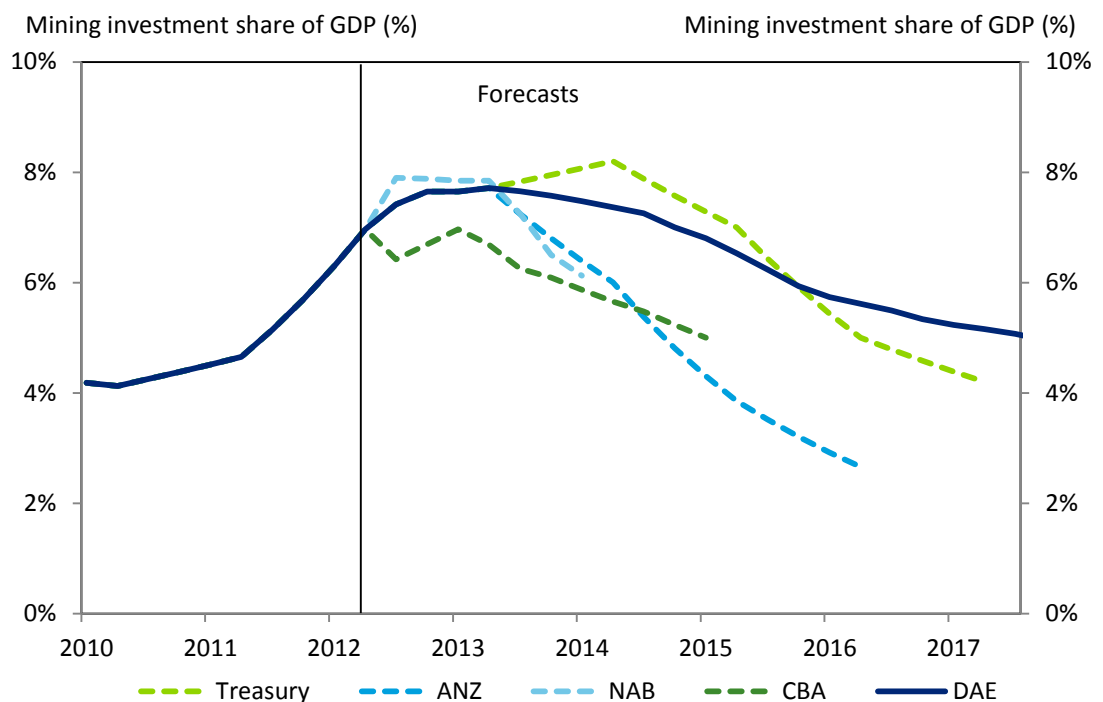
the expectations for the path of mining investment as noted by the major banks, Federal Treasury and Deloitte Access Economics.

The differing projected levels of mining investment as a share of GDP are driven by a number of factors including:

- differing assumptions regarding the profile of capital expenditure in current major projects underway
- different outlooks for global commodity prices and Australia's terms of trade; and
- differing assumptions regarding the future uptake of pipeline projects.

Deloitte Access Economics' view sees mining investment peak as a share of GDP during 2013-14. Thereafter, we project mining investment will decline, settling at approximately 5.5% of GDP by 2016 and falling below 4% of GDP by 2023.

Chart 3.3: Projected mining investment



Source: Deloitte Access Economics, Business Outlook, March 2013; Budget Paper No. 1, 2013-14; Macrobusiness, 2013.

In their 2013-14 Budget documents, Federal Treasury expect the peak in mining investment as a share of GDP to be reached in 2013-14, with a modest decline then seen in 2014-15. Mining investment projections are not specifically made beyond that point, though they can be inferred from an expected decline in the broader rate of business investment which is presented. That data suggests mining investment levels may fall sharply over 2015-16 and 2016-17.

The consensus view from the major Australian banks is also gloomy, and includes expectations of a shorter term fall in the value of capital projects in Australia by 2015. The ANZ Bank notes:

“Investment in the mining and resources sector will decline particularly sharply over the second half of 2014 and 2015 and at a somewhat quicker pace than the RBA is currently anticipating underlining the importance that other sectors of the economy strengthen over the next 12-18 months.”

The ANZ projections see mining investment fall to as low as 2% of GDP by 2016. Note that Chart 3.2 earlier showed that prior to 2005, mining investment as a share of GDP was often in the 1-2% range.

Meanwhile the NAB sees:

“Potential for mining investment to decline precipitously once existing projects have been completed. This “mining cliff” could appear as early as the first quarter of 2014.”

3.3 Broader investment outlook

Deloitte Access Economics prepared a report for the Business Council of Australian in 2012 (*Large capital projects – defining Australia’s investment challenge*), which examined the expected scale and scope of major capital investments in Australia.

That report noted the significant value of major projects both underway and in planning, which amounted to \$877.1 billion of projects (based on the March 2012 *Investment Monitor*). Twelve months on and the pipeline of projects still has much the same dimension. The March 2013 *Investment Monitor* reports some \$928.9 billion of projects which are either underway or in planning.

While the quantum of projects is very similar, the difference is that the broader environment has become less supportive of major projects, particularly as commodity prices have fallen. Hence some of the projects in planning have been delayed for consideration at a later time, and so are less close to fruition than a year ago.

That said, this is not true of all projects. The major project planning pipeline remains significant, and offers the country significant potential if the broader macroeconomic and policy environment is supportive.

Mining investment is also only one component of the overall investment story (albeit both a significant and potentially volatile one).

One can split overall business investment into major components of engineering construction (mining and heavy industry), engineering construction (infrastructure), and non-residential building projects.

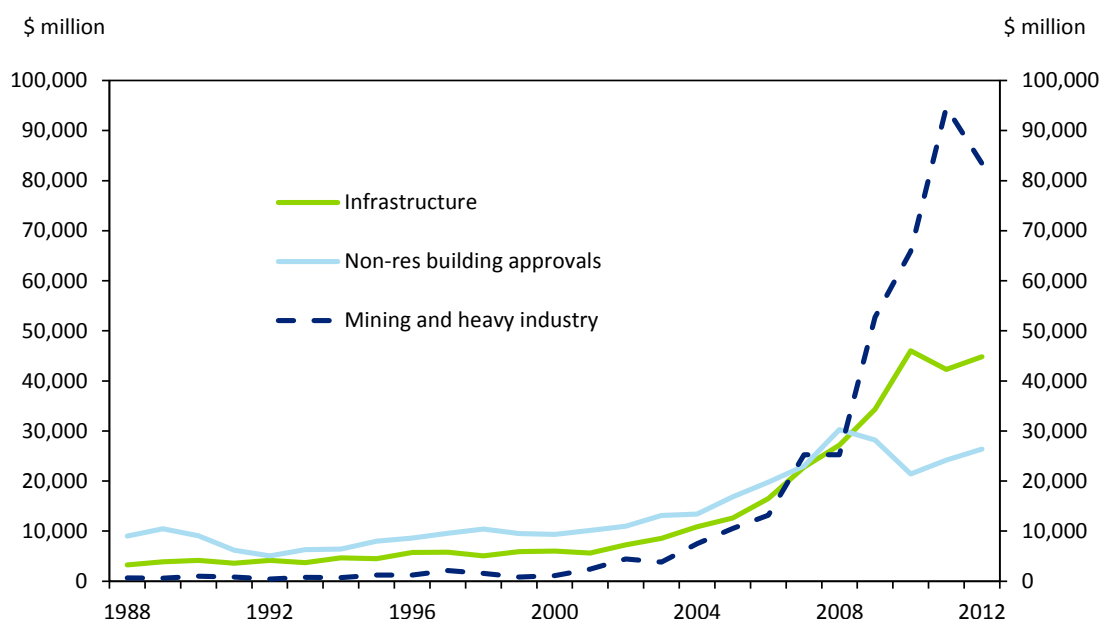
A decade ago it was non-residential building which was the dominant element, accounting for a greater share of investment than all engineering construction activity (mining and other). But that relativity has changed dramatically over the past decade as Chart 3.4 (which tracks the value of work yet to be done on investment projects which have been approved) shows.

Mining investment has risen dramatically since 2005, and even though a turning point has been seen, there remains a very substantial agenda of investment projects underway which still need to be completed. The value of **infrastructure investment** projects has also risen over time, though at a more modest rate. Part of this improvement has also been linked to increased demand for rail, road, port, energy and water infrastructure to support a higher level of mining demand.

Activity on **non-residential building** projects on the other hand has started to pick up since 2010, though investment levels remain below those seen prior to the GFC. Relatively high vacancy rates in capital city office markets and a weak outlook for white collar employment (albeit better than the outlook for blue collar employment) are likely to constrain the rate of new office developments. There is also a link here to mining activity - the better performing office markets in recent years have been those exposed to the mining sector (namely Perth and Brisbane), but demand in these markets is now starting to wane.

Retail is unlikely to pick up the slack following a few years of more subdued retail spending to 2012 and as online delivery challenges the brick and mortar retail business model. That means that the non-residential building sector may see only modest growth over the coming years.

Chart 3.4: Value of work yet to be done



Source: ABS 8731.0, 8762.0

Chart 3.5 shows Deloitte Access Economics projections for the overall level of business investment and total investment in Australia (as a share of GDP), plotted against what has been a key support for the surge in mining investment activity in recent years, Australia's terms of trade.

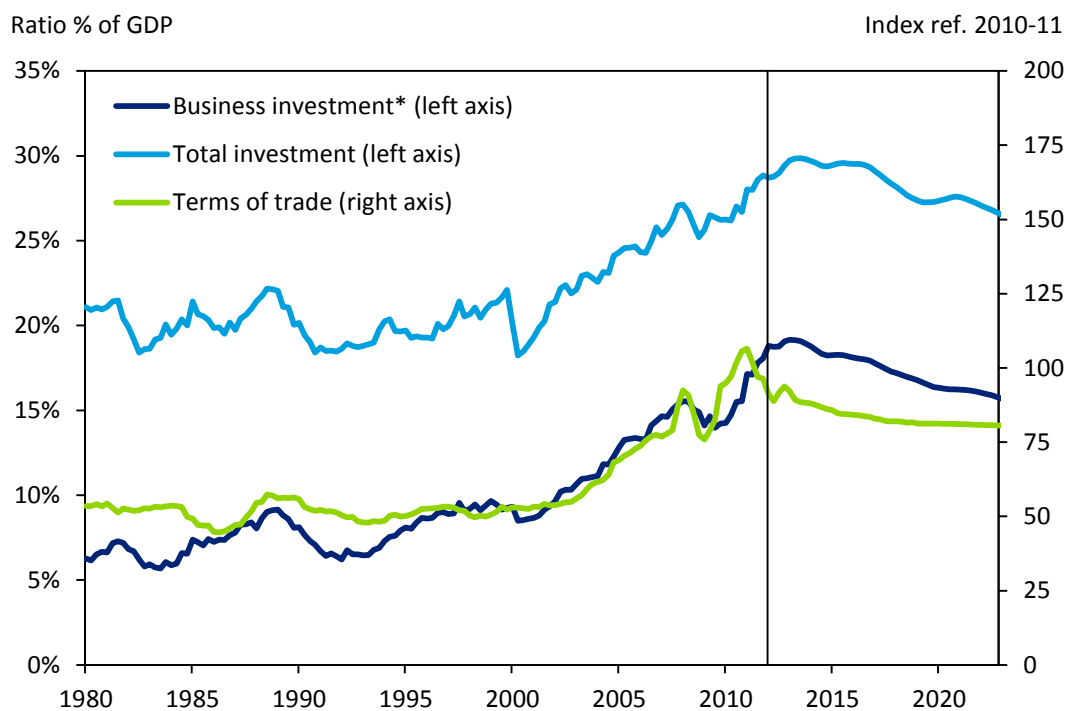
Total investment levels are expected to rise from \$423 billion in 2012 to \$550 billion by 2023 (in real terms, base year 2010-11). However, the chart shows that as a share of the economy, both total investment and business investment are expected to fall over time.

This is very much driven by declining mining investment, and related to the continuing decline in Australia's terms of trade over time.

It is worth noting that Deloitte Access Economics expects Australia's terms of trade to settle below the peak seen in 2011, but still to remain at levels which are historically quite high. This reflects expected continued urbanisation and industrialisation from China, India and other emerging economies, and a rising cost of extraction in the mining sector which has supported price growth.

A continued high level for commodity prices helps support the view that we may well see continued good levels of mining investment over time (albeit still considerably lower than the very high levels seen recently).

Chart 3.5: Australian terms of trade and investment



Source: Deloitte Access Economics, 2013

*Underlying business investment

Both investment series are in real terms

The projected path for business investment shown above also includes **some substitution in the Australian economy from mining investment to other areas of investment** over time. This is not expected to be enough to stop overall investment levels from falling as a share of the economy, but is expected to provide some offset along that path.

The gap between business investment and total investment is primarily filled by public investment and dwelling investment.

3.4 Infrastructure investment

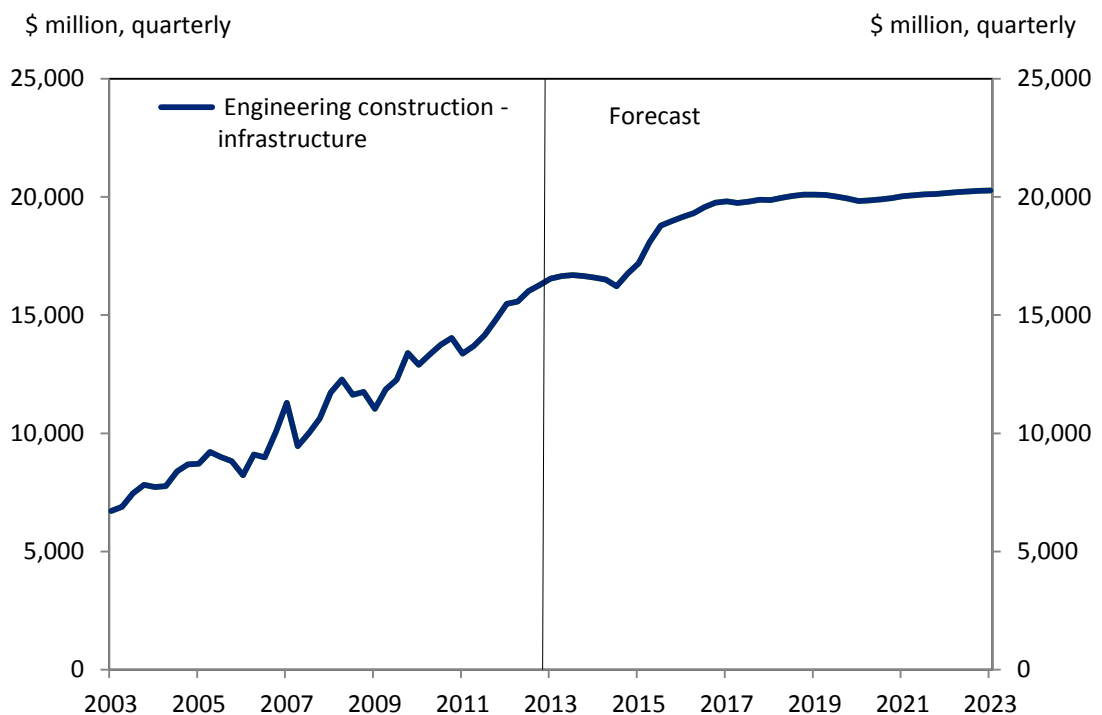
There is potential to see some growth out of areas of infrastructure investment over the next few years. That is particularly true for those areas of **infrastructure** which will play a supporting role to lifting mining production, including railways, port projects and electricity.

Other elements of infrastructure look more like tracking steady than achieving much growth. Investment in new road projects is projected to remain relatively flat (with losses on several private toll roads a deterrent to further investment), while water investment may move down after some big completions in recent years.

Chart 3.6 shows that Deloitte Access Economics expects overall engineering construction activity on infrastructure (in real terms, base year 2010-11) to rise modestly over time. Growth in the level of infrastructure investment is seen as likely to continue, driven by broader population and economic growth. Over the next ten years, Deloitte Access Economics expects the total cumulative infrastructure spend to reach \$767 billion.

Having recovered from a period of more limited investment in the early to mid-2000's, infrastructure investment currently accounts for approximately 4% of GDP. Deloitte Access Economics expects infrastructure investment to peak at 4.7% of GDP in 2017, before returning to around 4% in the longer term.

Chart 3.6: Projected engineering construction activity - infrastructure



Source: Deloitte Access Economics

Note: Infrastructure investment includes value of engineering work done by the private and public sector in Transport, Energy, Telecommunications and Water.

Some improvement in the rate of infrastructure investment is seen as occurring over the next few years. In part this is drawn from *Investment Monitor* information on the infrastructure project pipeline, which remains extensive, and can play a supporting role to rapidly rising mining production. Beyond the next few years, infrastructure investment is expected to continue rising at a modest rate, playing a supporting role to increased population levels and growth in the broader economy as it has done over time.

Of course none of this should be taken for granted. For continued growth in the level of infrastructure investment to actually be achieved, new projects need to be designed, approved, financed and delivered – none of which is an easy task.

Federal and State governments will play an important role in the future profile for infrastructure spending in Australia, both through direct funding of such projects and through setting the conditions for further private sector delivery of infrastructure. That said, the future Federal Budget position looks very tight, and with State governments increasingly looking to get their own budgets in order, the next few years may see less willingness to allocate funding to infrastructure (with continuation of the NBN in one form or another an exception).

Non-resources manufacturing investment has all but dried up in Australia, and there is no prospect of an investment resurgence at present given the \$A and other competitiveness factors.

3.5 Commercial construction

Non-residential building investment has picked up a little though remains subdued. New approvals have lifted over the past two years, but are still below their pre-GFC peak. Low interest rates will provide support, but the overall environment for office and retail demand still remains somewhat dour at present, with strong growth from this category of investment still some time off.

So other areas of investment (outside of direct mining investment) may provide some offset over time to overall levels of investment. However, it should be noted:

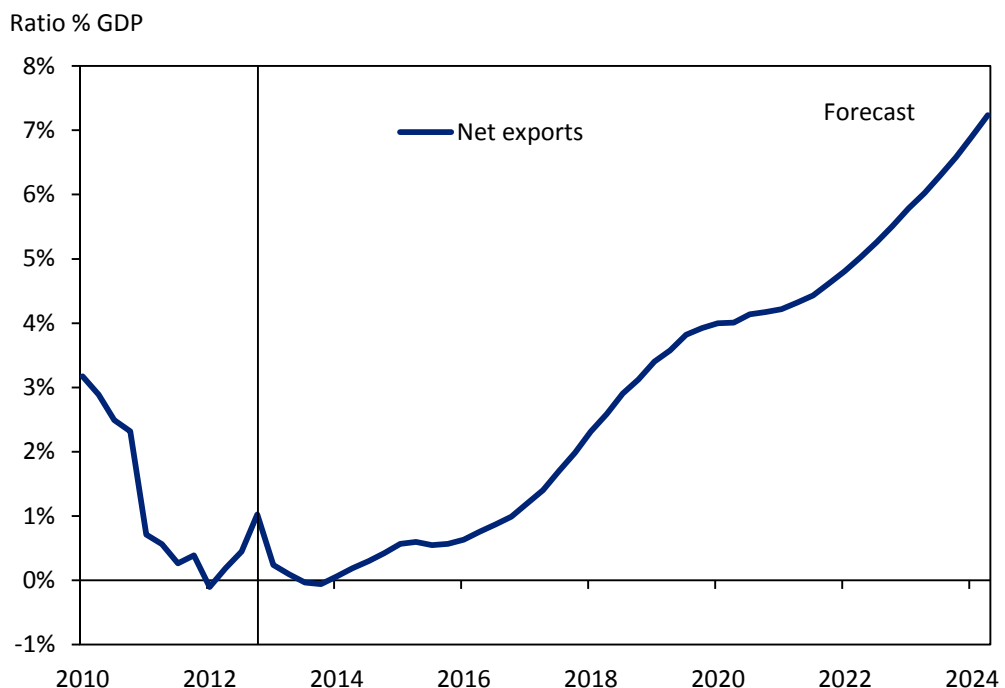
- **It is very unlikely that other areas of investment will pick up pace enough to completely offset the decline expected to be seen from mining investment** (and the risk here is to the downside, based on the ANZ and NAB projections for mining investment shown earlier).
- **An improvement in the levels of infrastructure and non-residential building over time cannot be taken as a fait accompli.** These will require a supportive macroeconomic environment, and particularly in the case of infrastructure, support from government in terms of planning, regulation and financing mechanisms to allow projects to proceed.

There will also be some offsets to the Australian economy for a declining path of investment from other components of final demand.

3.6 Economic outlook

Given the high levels of investment achieved in recent years, Australia's capital stock has expanded significantly. This has created a long term increase to Australia's production capacity. Seeing that the vast majority of output produced by the mining sector is exported, Deloitte Access Economics expects **net exports** to rise over time (see Chart 3.7). From having been a burden on GDP growth in recent years, net exports are expected to contribute around half a percentage point to GDP growth on average per year for the foreseeable future.

Chart 3.7: Australian net exports



Source: Deloitte Access Economics, 2013.

Unfortunately, even the shift to higher levels of exports is unlikely to completely fill the vacuum left by falling mining related investment in the short term. As such, Deloitte Access Economics expects **GDP growth** to remain below 3% per annum over 2012-13, 2013-14 and 2014-15 (with 3% at the lower bound of 'trend' growth over the past decade).

Given the more positive investment outlook held by Treasury, they also hold a more positive GDP growth outlook. Federal Budget projections forecast GDP growth of 3% for 2012-13, 2.75% for 2013-14 and back to 3% for 2014-15.

Meanwhile, the outlook from the major banks on the broader economy is somewhat more pessimistic. The NAB notes that:

"Any sharp decline in mining investment in 2014 would be highly detrimental to growth without an offset. And that, without another mega project in 2014, the decline in mining investment will take 2% points off GDP growth"

Given that it takes more people to construct mining related infrastructure than it does to operate a mine, direct **employment** in the mining and related sectors is also expected to suffer under a lower level of resource related investment.

However, the decline in engineering construction work in the resources sector will potentially provide other sectors (that have been crowded out for a while now) with additional workers. This includes workers with skills which could be readily transferred into other sectors, such as key occupations within the technical and trades workers group, machinery operators and drivers and project managers. These workers could be re-deployed into other areas of engineering construction (infrastructure), the commercial construction or residential building sectors. Indeed, for Treasury and RBA projections for an upturn in the latter sector to manifest, a large amount of additional labour would need to flow into residential building. The Construction and Property Services Industry Skills Council claims that in order for the planned upturn in residential building to occur, an additional 45,000 workers will be needed over the next three years.

Deloitte Access Economics expects overall employment to grow by a subdued 1.2% over 2013-14 and 2014-15 before stronger growth returns in 2015-16. That puts employment growth over the next couple of years well below trend.

Employment expectations from the RBA are broadly in line with the Deloitte Access Economics view, with expectations more on the downside, noting:

“Overall, leading indicators of employment have been somewhat mixed and, with firms more focused on productivity gains, employment growth is expected to moderate in the near term, with the unemployment rate drifting higher until mid-next year.”

4 Investment scenarios

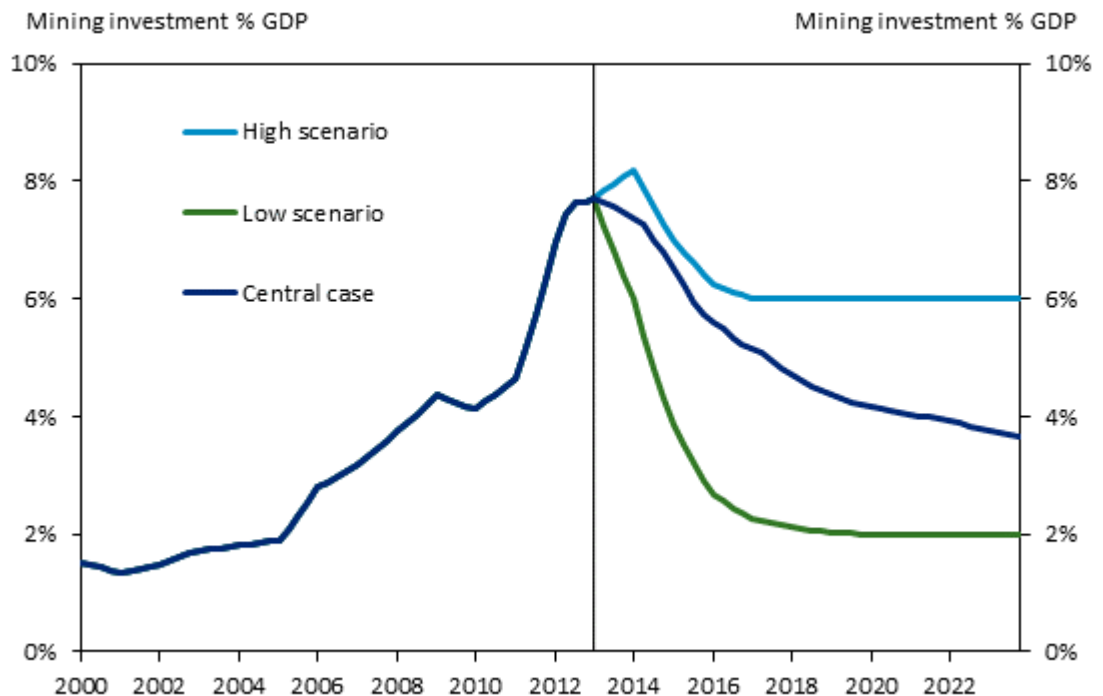
There is significant conjecture amongst forecasters about the future profile of mining investment in Australia. While all reputable forecasters are expecting resources investment to peak soon, the degree of the following decline in investment is uncertain. Moreover, the subsequent impact on the broader economy is the topic of ongoing debate. This scenario analysis contributes to the debate by quantifying the impact of two different mining investment scenarios on GDP, and components thereof.

4.1 Scenario analysis methodology

The scenario analysis will feature a high and a low mining investment scenario, compared to a central case. The central case is drawn from Deloitte Access Economics' forecasts published in the March 2013 issue of *Business Outlook*. The high investment scenario includes Federal Treasury's short term forecasts² presented in the Federal Budget 2013-14, with a maintenance of a high level of mining investment as a share of GDP after 2014-15 (a path which is different to the Treasury forecasts). The low scenario is inspired by ANZ's mining investment forecasts. These high and low forecast paths for mining investment are illustrated below in Chart 4.1.

Considering the inherent differences in the underlying forecast methodologies, the macroeconomic results presented for each scenario are not comparable to the macroeconomic views presented by the aforementioned institutions. They are presented here as Deloitte Access Economics' analysis of differences in macroeconomic outcomes as a result of higher or lower mining investment paths.

² Treasury forecast only used for the financial years 2012-13 to 2014-15.

Chart 4.1: Mining investment scenarios

Source: Deloitte Access Economics

The scenarios are created using a macroeconomic simulation model of the Australian economy. The simulation model accounts for direct and indirect effects on GDP of a change to investment. The direct effect accounts for offsets to GDP attributable to the change in investment as well as subsequent changes in imports and exports. Indirect effects are addressed using feedback loops driven by changes to interest and exchange rates.

The interest rate feedback loop accounts for changes in output for interest rate sensitive sectors. The interest rate sensitive sectors included in the model are housing construction and retail. Similarly, the exchange rate feedback loop accounts for changes in output for exchange rate sensitive sectors. The exchange rate sensitive sectors included in the model are manufacturing, tourism and the international student sector.

Underlying parameters in the model are adjusted to reflect the particular impacts expected from a mining investment shock, contrary to other types of investment shocks. This is particularly true of the relationship between mining investment and net exports.

Based on recent research conducted by the RBA a 1:2 relationship has been assigned between imports and investment³. This means that for every dollar of mining investment spent in Australia, 50 cents is imported.

Employment effects are also considered, using economy wide ratios of value added to employment. These ratios are based on the construction sector for investment impacts,

³ Conbolly and Orsmond (2011), p. 31-32

the mining sector for direct output (export) impacts, and all industries for broader indirect or feedback effects.

4.2 Central case scenario

The central case scenario is based on Deloitte Access Economics' March 2013 edition of *Business Outlook*. Some further detail on these projections, such as prospects for mining and infrastructure investment, were discussed in Chapter 3 of this report.

Key results from the central case projection are presented in Table 4.1. GDP is expected to grow at a little more than 3% per year on average over the forecast horizon. Investment growth is subdued given the moderation in mining investment; however, this is partly offset by strong growth in net exports. Employment growth too is relatively subdued due to expected productivity increases as the workforce shifts into more labour productive industries such as mining operations and high skilled services.

Table 4.1: Key results, central case

	Average growth		Real \$ billion	
	FY13-FY18	FY18-FY23	FY18	FY23
GDP	3.1%	3.2%	1,737	2,037
Investment	1.6%	1.2%	304	324
Imports	4.5%	4.7%	403	508
Exports	5.9%	7.2%	440	623
Employment ('000)	1.5%	1.4%	12,478	13,405

Source: Deloitte Access Economics

Base year for real units is 2010-11

4.3 High investment scenario

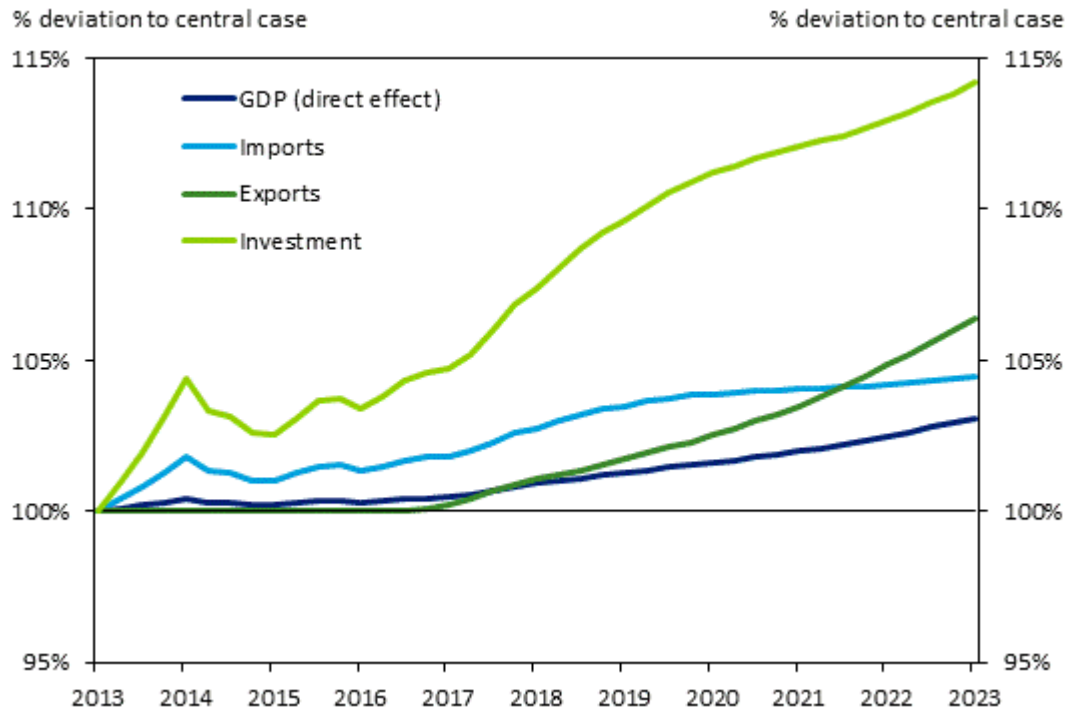
The high investment scenario includes Treasury's mining investment forecasts to 2014-15 as published in the most recent Federal Budget. We then allow for a further moderate tapering in the rate of mining investment (so that it levels out at 6% of GDP). Implicitly, this scenario assumes that many of the large resources projects which are in planning at present do receive approvals over the coming few years. This flow of new projects sustains mining investment at a high level (though still a step down on current rates of activity).

The **direct effect** of the investment shock produces an increase in imports and exports associated with the higher than expected amount of investment. While imports immediately deviate from the central case projection, it takes longer for exports to be affected. This reflects the long construction phases associated with mining related investment. Increased investment and exports dominates the import offset throughout the forecast period. As such, the direct effect of the investment shock sees the level of GDP at 2.9% higher than the central case by FY23 (shown in Chart 4.2).

Note that exports contribute significantly more to GDP in the final five years of the forecast compared to imports. Mining projects will generally have expected lives of around 30 to 40 years (certainly longer than the 10 year horizon shown here). So as projects are completed

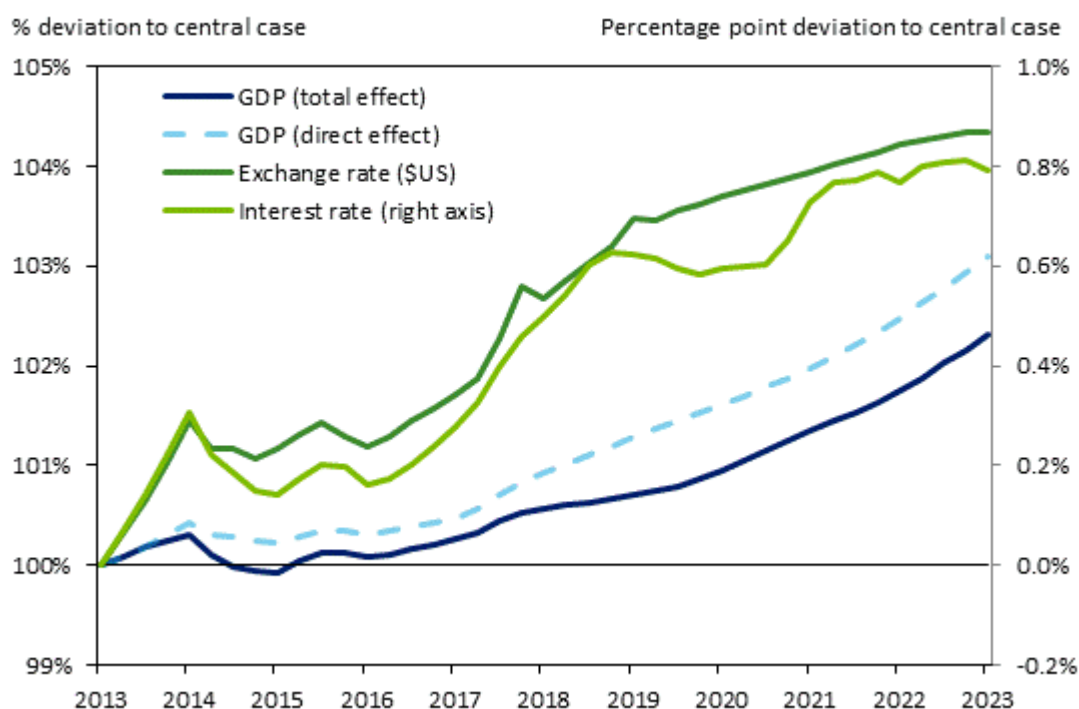
over time, the expected export effect builds (and there is no offset for projects being decommissioned over this timeframe). Mining capital is also particularly productive – historically there has been a greater output response from mining investment than for the ‘average’ capital investment.

Chart 4.2: Direct effect of high investment profile



Source: Deloitte Access Economics

As well as affecting GDP directly, increasing investment will also create **flow-on effects**. These flow-on effects are modelled as driven by changes to interest and exchange rates. In this scenario, interest rates rise in response to the higher level of activity in the Australian economy, while increased demand for the \$A, on the back of higher interest rates and investment, sees the \$A appreciate. Given the sensitivity of housing investment and retail spending to rising interest rates, both of these sectors see reduced activity relative to the central case scenario. Similarly, the manufacturing, tourism and the international education sectors are adversely affected by the rise in the \$A. As a result, while higher investment raises GDP, the total effect is less than the direct effect alone, as shown in Chart 4.3. By FY23, the total effect of the higher investment profile sees GDP levels exceed the central case by approximately 2.1%, or \$43 billion dollars (real terms, base year 2010-11).

Chart 4.3: Total effect of high investment profile

Source: Deloitte Access Economics

Table 4.2 presents key summary results for the high investment scenario. In the first five years, GDP grows at a similar rate to that experienced under the central case scenario. This is because import growth and flow-on effects offset much of the gains to investment. However, in the five years thereafter GDP growth is improved by an average of 0.4% per annum compared to the central case. This increase can largely be attributed to export growth on the back of the increase in capital stock and causes the level of GDP to exceed the central case scenario in FY23 by 2.1%.

Given the increase in output, employment in the high scenario exceeds the central case by 38,000 in 2012-13. This increase is centred on more mining and construction employees.

Table 4.2: Key results, high case

	Average growth		Real \$ billion	
	FY13-FY18	FY18-FY23	FY18	FY23
GDP	3.2%	3.6%	1,745	2,079
Investment	2.9%	2.6%	324	368
Imports	5.0%	5.1%	413	530
Exports	6.1%	8.2%	444	659
Employment ('000)	1.5%	1.5%	12,493	13,443

Source: Deloitte Access Economics

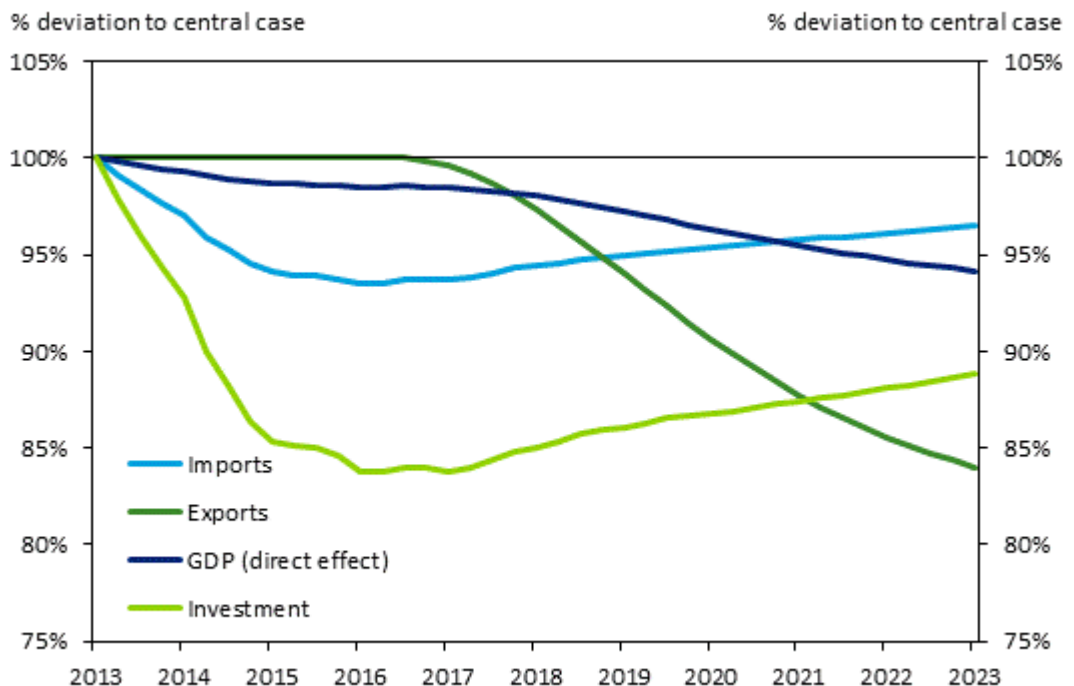
Base year for real units is 2010-11

4.4 Low investment scenario

The low investment scenario is inspired by ANZ's recently published forecasts for mining investment. This scenario sees a sharp decline in mining investment over the next few years. In the long run, mining investment to GDP settles at 2%, approximately equal to the long run average share of mining investment to GDP.

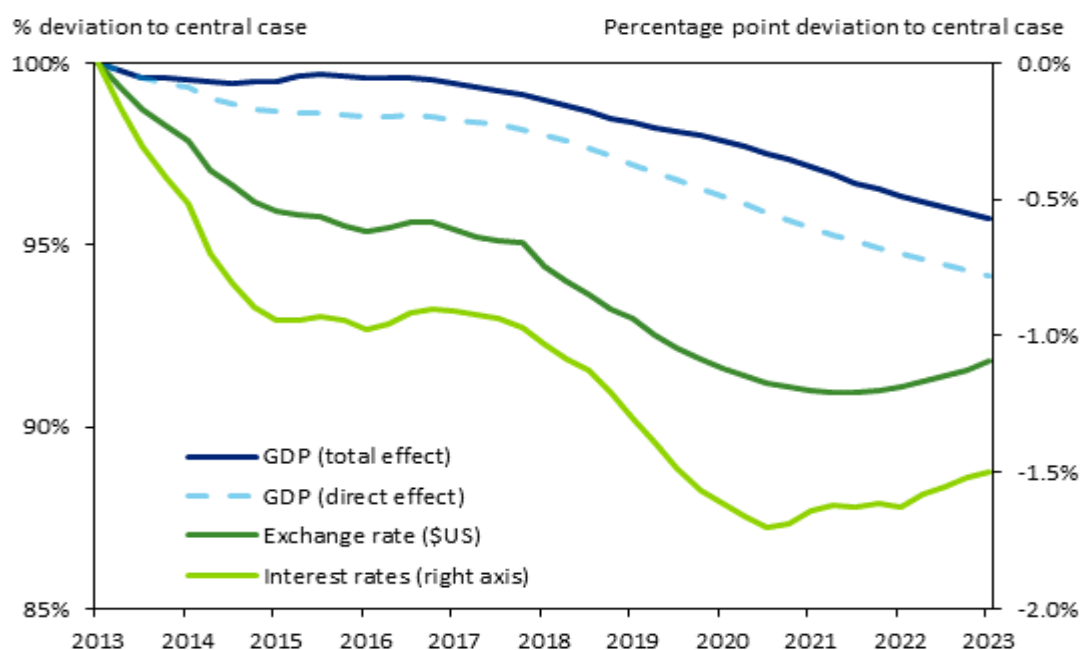
Chart 4.4 highlights the **direct effect** of the persistently lower levels of mining related investment compared to the central case. GDP remains a little below the central case projection through the first few years as lower levels of investment also slow the demand for imported capital goods. However, after a few years, foregone investment begins to have a significant effect on the nation's capital stock. Given the longevity of mining related capital, this reduces Australia's production capacity for the ten year forecast horizon shown here, and so exports end up being much lower than they would otherwise be. As a result, the direct effect of a lower mining investment profile sees GDP reduced by 5.6% in FY23.

Chart 4.4: Direct effect of low investment profile



Source: Deloitte Access Economics

There are also important **flow-on effects** which must be accounted for to calculate the final impact on GDP. As investment, exports and GDP are lower relative to the central case, so too are interest rates and the exchange rate. This has the effect of stimulating the tradables and interest rate sensitive sectors. As such, the total effect on GDP of a lower mining investment profile is diminished because of increased activity in areas such as housing, retail, manufacturing, tourism and the international student sector (see Chart 4.5).

Chart 4.5: Total effect of low investment profile

Source: Deloitte Access Economics

Given the relatively large fall in investment compared to the central case (and compared to the high scenario), the effect on the macro-economy is significant. GDP growth is 0.2% lower per annum for the first five years of the forecast and 0.6% lower than central case growth for the next five years. While imports and flow-on effects offset much of the broader effect of the fall in investment in the short run, the effect of foregone exports dominates the macroeconomic outcomes over the longer term. The cumulative effect is that the level of GDP is lower by \$83 billion compared to the central case, and \$125 billion compared to the high case, by FY23.

The biggest loss of output is through foregone exports. Given the very high level of labour productivity associated with the mining sector, a loss of exports does not translate into as much of a loss of employment. On the other hand, the economic activity gained via feedback effects is likely to be more labour intensive. As such, employment under the low scenario is only 19,000 less than the central case, and 56,000 less than the high case by FY23.

Table 4.3: Key results, low case

	Average growth		Real \$ billion	
	FY13-FY18	FY18-FY23	FY18	FY23
GDP	2.9%	2.6%	1,723	1,954
Investment	-1.8%	2.2%	257	287
Imports	3.2%	5.2%	379	489
Exports	5.6%	4.0%	433	526
Employment ('000)	1.5%	1.5%	12,450	13,387

Source: Deloitte Access Economics

Base year for real units is 2010-11

5 Conclusions

The resources boom has been a very important support for economy activity in Australia over the past decade or so. The initial benefit to Australia was seen primarily through the price of mining commodities. This phase saw prices for Australia's exports of industrial commodities rise, effectively stimulating the investment phase of the mining boom. The prices for mining commodities (and Australia's terms of trade) peaked in 2011, and the investment phase of the mining boom is now nearing its peak. We are now seeing a transition from mining investment to mining exports, but this transition is likely to see overall economic activity (and employment) on a somewhat lower growth path as a result.

Indeed, the effect on economic activity of the transition from mining investment to mining exports is the topic of significant debate. In particular, there is uncertainty surrounding the future profile of mining investment. This report aims to contribute to this debate by conducting a scenario analysis to quantify the effect of different mining investment forecasts on economic activity.

Two mining investment scenarios were compared to a central case presented by Deloitte Access Economics in the March 2013 edition of *Business Outlook*. The high mining investment scenario sees mining investment still fall in the short term, before settling at 6% of GDP over time. The low scenario was inspired by the mining investment outlook recently presented by ANZ.

The scenarios were calculated using a macroeconomic simulation model of the Australian economy. The model accounts for both the direct effect of changes to mining investment, and major indirect flow-on effects of such changes.

The broader economic effect of different profiles for mining investment becomes greater as time goes on. In the short run, changes to investment are partially offset by changes to the path of imports (with mining investment seen as being particularly import sensitive), and flow-on effects to interest rate and exchange rate sensitive sectors of the economy. Over the longer term however, the permanent fall, or rise, in Australia's capital stock does have a significant effect on production capacity. This is particularly true given that mining capital is particularly productive and production phases following mining investment are expected to have long lives.

Given the relatively greater difference to the central case in the lower mining investment scenario, the effects on economic activity from this scenario were more profound. In the lower case scenario, GDP was 0.8% (\$15 billion, real, base year 2010-11) lower than the central case after five years, and 4.0% (\$83 billion, real), base year 2010-11 lower by FY23. On the other hand, the high investment scenario sees GDP higher than the central case by 0.5% (\$8 billion, real, base year 2010-11) after 5 years, and by 2.1% (\$43 billion, real, base year 2010-11) by FY23.

The changes to output caused subsequent changes to employment. Under the low scenario, employment falls by 19,000 compared to the central case, and 56,000 compared to the high case by 2023.

The central case projections presented here allow for some offset to declining mining investment within the broader investment outlook.

Indeed, there is potential to see some growth out of areas of infrastructure investment over the next few years. That is particularly true for those areas of infrastructure which will play a supporting role to lifting mining production, including railways, port projects and electricity. Spending on other elements of infrastructure may track steady rather than achieving growth, though there remains significant potential for improvements across a range of urban infrastructure.

However, it is very unlikely that other areas of investment will pick up pace enough to completely offset the decline expected to be seen from mining investment.

That said, both public and private sector proponents have identified a cast range of major project opportunities. The March 2013 edition of Deloitte Access Economics' *Investment Monitor* shows the total value of projects underway and in planning at \$877.1 billion. Some projects have become less likely over the past year but nevertheless, many opportunities are still being investigated.

For a number of these projects to get the go ahead will require a supportive macroeconomic environment, and particularly in the case of infrastructure, support from government in terms of planning, regulation and financing mechanisms to allow projects to proceed.

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