

The Mining 'Cliff': How far have we come?

by NAB Group Economics



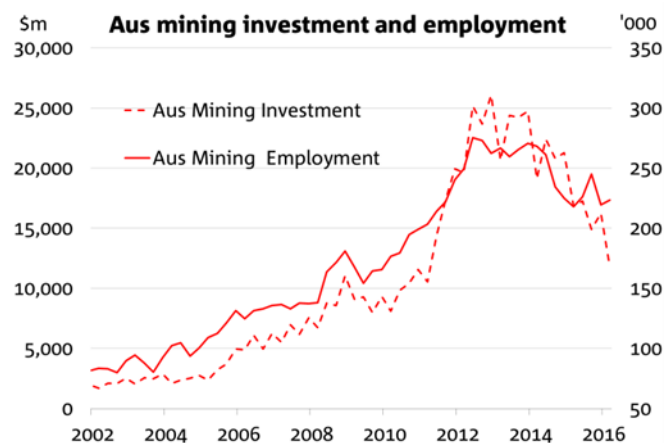
Key points:

- The transition of the Australian economy from mining to non-mining activity to date has been smoother than many had expected, aided by a low AUD and interest rates. Nevertheless, the ongoing unwinding of Australia's once-in-a-100-year mining investment boom presents significant challenges to a number of industry sectors and skill groups in the economy. In this note, we estimate the extent to which mining investment and employment have progressed in their respective cycles, and how much further their adjustment has to run.
- So far, the winding down of the mining investment boom has largely unfolded as many had predicted, although the associated fall in direct mining employment has been more muted to-date. We believe that mining investment is currently more than half-way through the cycle, while employment is slightly below the half-way mark – with the difference likely to be related to the significantly higher labour intensity of LNG projects in the (near) completion stage of the construction phase.
- Following the peak and subsequent decline of commodity prices and Australia's terms of trade, mining investment has followed suit, steadily declining after peaking 2012-13. The question remains how much further does the mining investment downturn have to run, and what have been the broader consequences for the economy? Our analysis suggests that, given the existing pipeline of mining projects scheduled for completion, the investment downturn is a little over half complete in level terms. As a percentage of GDP, mining capex has fallen from 8% GDP at its peak to around 4% currently and expected to fall to 1½% of GDP by late 2018.
- Higher mining output has not fully offset the drag from investment. Furthermore, the relatively labour-intensive nature of the mining investment phase (relative to the operational phase) means that the decline has significant implications for the local labour market.
- We estimate that 46k mining jobs were shed between the peak in 2012-13 and 2014-15 and around 50k more will be cut going forward. The

majority of the job losses are likely to come from WA due for a number of reasons, including that: 1) WA's mining investment and employment cycles are currently less progressed than Queensland, 2) WA accounts for a larger share of total investment and employment in the country, and 3) the labour intensity of commodity projects in their operational phase in WA is lower than in Queensland.

- This will cause significant headwinds, especially in geographically affected regions and in certain specialised skill groups. However, it is not unmanageable at the national level with offsetting job creation elsewhere (particularly in services sectors) - we are forecasting 18k additional jobs to be created per month over the next few years, with the unemployment rate to track down towards 5½% by mid-2017 before inching up thereafter.

Chart 1: Mining Investment and Employment



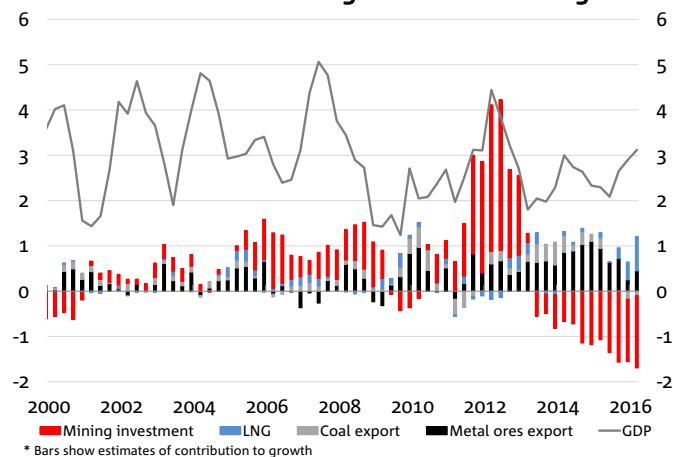
Source: ABS, NAB Group Economics

More than half way through the mining investment downturn

The economic significance of Australia's once in a generation mining boom has not been lost on most people. China's seemingly insatiable demand for commodities and the determination of major mining firms to meet this demand before their competitors – seemingly at any cost – saw unprecedented levels of mining investment and commodity exports supporting Australian growth during a very difficult time in the global economy. However, this situation was never going to last indefinitely, and a combination of slowing demand from China and

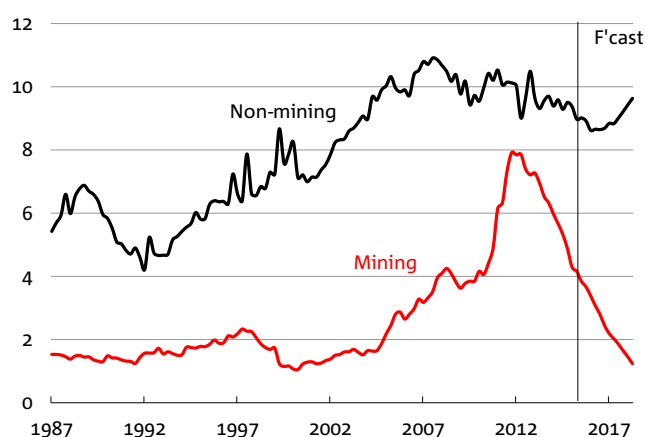
increased commodity production saw bulk commodity prices peak in late 2011. **Mining firms' enthusiasm for investment also began to wane as the financial viability of new projects declined along with commodity prices.**

Chart 2: Contributions to growth are shifting*



Sources: ABS, NAB Group Economics

Chart 3: Mining investment to fall further (% of GDP)



Sources: ABS, NAB Group Economics

With mining investment accounting for around two-thirds of economic growth in Australia in 2011 and 2012, attention has shifted to just how much the so called 'mining investment cliff' will detract from growth – how far has it fallen and how much is there to go? Unfortunately, comprehensive data on mining investment in the National Accounts are limited in the sense that data on mining gross fixed capital formation (GFCF) are only published on an annual basis. While other sources such as the ABS Capital Expenditure Survey are available on a more timely basis (quarterly), limitations on its coverage means it fails to capture almost 20% of mining capex (relative to National Accounts measures).

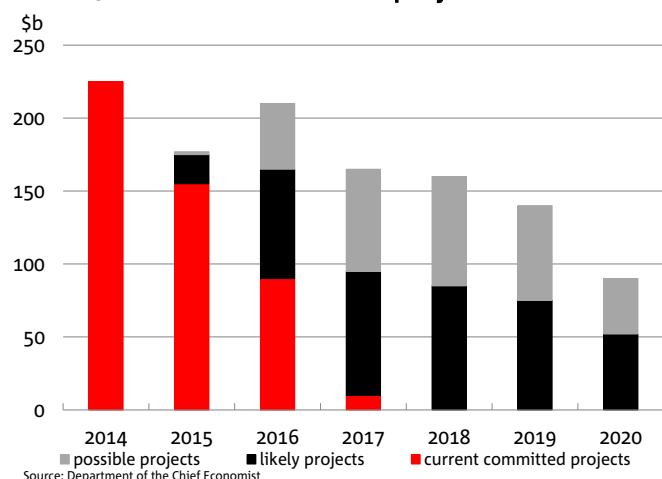
The Annual National Accounts however, can give us some insight into how much mining investment fell over 2014-15. According to these data, mining GFCF

fell by 17.3% in 2014-15 (in real terms), following a decline of 8.5% the previous year (accounting for around 5.5% of real GDP, down from a high of 7.6% in 2012-13). However, given how rapidly mining investment is contracting, it is more useful to get a quarterly read as the current level of mining investment can significantly deviate from the annual average. A quarterly proxy can be achieved by supplementing the National Accounts with the more timely data from the Capex survey and engineering construction reports. These data suggest that mining investment actually fell to just 4.2 % of GDP in Q4 2015 (see Chart 3 above).

In terms of how much further mining investment is likely to fall, there is a considerable amount of information available on the current pipeline of committed projects that can help to inform our projections. With lower commodity prices and higher costs contributing to a slowdown in the number of newly committed projects, the pipeline has been in steady decline – committed resource projects peaked in 2012 at around \$268 billion and are projected to fall below \$200 billion by end-2015, according to Department of Industry data. Using this information on the remaining pipeline in conjunction with observed rates of mining construction to date, **our models suggest that mining investment is likely to fall by around 70% from its current level over the next 3 years – implying that we are currently just over half-way down the mining investment 'cliff'. Given our expectations for economic growth over that period, mining GFCF is expected to drop to just 1¼% of GDP (Chart 3), which is toward the lower end of pre-boom historical levels.**

The timing of the decline is still very uncertain. However, given that market conditions, cost overruns and legal impediments have increasingly contributed to project delays. Data compiled by the Federal Office of the Chief Economist suggests that while the pipeline of resource projects could actually be a little larger in 2016, only around \$80 billion worth of projects are currently committed to. Nonetheless, the \$130 billion or so worth of likely and possible projects present some upside risk to our forecast.

Chart 4: Resource committed project scenarios

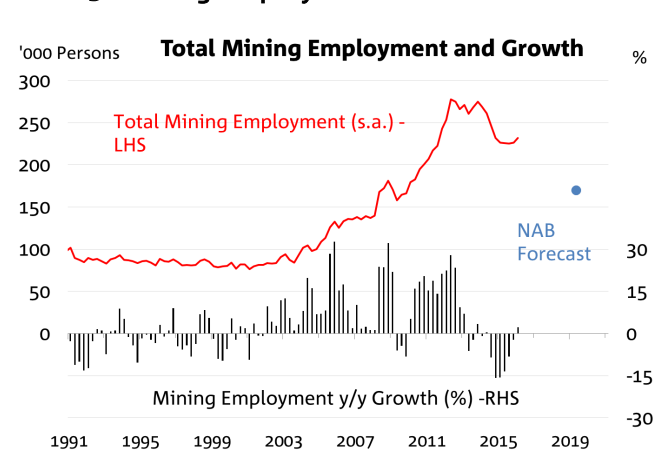


Construction slowdown to have further impact on the labour market

The transition to the operational phase for these major resource projects has big implications for the labour market, particularly those in WA and Queensland. That is because available information suggests that the investment/construction phase of the mining boom is likely to be much more labour intensive than the production phase. While there are a number of spill-overs to other industries, this note focusses on the direct impact for mining employment where the biggest adjustment is likely to occur.

Leveraging on micro ABS employment data by occupation, we estimate that 122k mining construction jobs were created between the start of the mining boom (in 2004-05) and the peak (2012-13), compared to the creation of 34k operational jobs and 13k exploration-related jobs. The number of construction jobs has already begun to unwind and further losses over coming years are expected to more than offset the number of operational jobs created through completed projects (see below). *This is an abridged version of a more extensive research note [“The Evolution of Mining Employment”](#).*

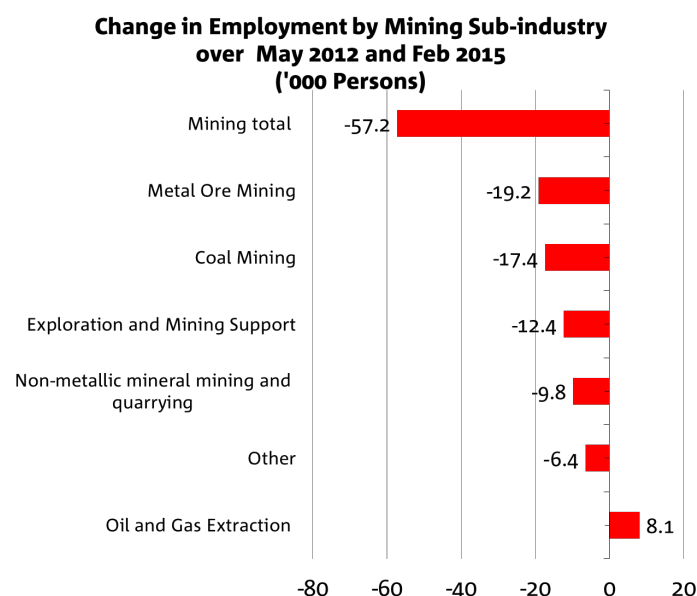
Chart 5: Mining Employment



Mining employment fell notably between May 2012 and Feb 2015, before showing signs of stabilisation over most of 2015, and a minor uptick more recently. At its current level, mining employment is moderately higher than previously anticipated given the level of mining investment. Based on original quarterly data, the sub-industry sectors of metal ore mining and coal mining showed the largest declines over this period of 19,100 and 17,400 jobs respectively.

Meanwhile, oil and gas extraction employment rose by 8,000. This potentially reflects the completion of a number of smaller coal and iron ore projects during this time, and the intensifying construction activity of a number of larger LNG projects. In 2015, stronger labour requirements on the back of the completion/near-completion of several major LNG mining projects such as Pluto, Queensland Curtis LNG (QCLNG) and Gladstone LNG (GLNG), which are significantly more labour-intensive than most other types of commodity projects, appear to have propped up mining employment. **This suggests further downside risks to mining employment once the construction phase of these “lumpy” projects wind down.**

Chart 6: Change in mining employment by sub-sector



Source: ABS, NAB Group Economics

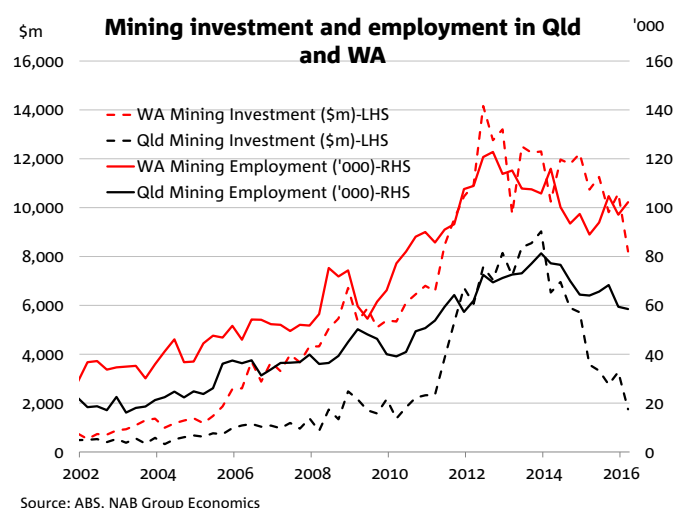
State details

The dramatic rise in mining investment and employment from the mid-2000s to 2012-13 has been largely driven by Western Australia and Queensland. However, the type and timing of mining projects that have dominated in each state have varied across time. **This has resulted in investment trajectories which are quite different, with Queensland at a**

more advanced stage in its mining employment cycle (see Chart 7). However, the employment trajectories for Queensland and WA have been more in sync (Chart 7).

The pick-up in mining investment in WA occurred slightly earlier than in Queensland, and its trajectory is generally less “lumpy” over time. This is largely attributable to the large iron ore mining projects commenced in the early 2000s in the Pilbara region by Rio Tinto and BHP. This included the development of the Hope Downs and Cloud Break mines, before the commencement of the large LNG projects of Pluto and Gorgon in the second half of the 2000s, followed by the Wheatstone (LNG) and Roy Hill (iron project) projects in 2011. Besides iron ore, there was also significant mining investment in WA over the 2000s in commodities such as nickel, alumina and gold which contributed to a relatively diverse range of projects.

Chart 7: Mining investment and employment by state



In the case of Queensland, coal projects in the Bowen Basin constituted most of the mining investment prior to 2010, before the significantly more capital-intensive LNG projects of Queensland Curtis LNG (QCLNG), Australia Pacific LNG (APLNG) and Gladstone LNG (GLNG) took centre stage and which resulted in an intensive flow of capital and labour to the Surat Basin and Gladstone within a short period of time.

Meanwhile, the mining employment profiles for WA and Queensland have exhibited similar growth trajectories over time (Chart 7), rising by close to three times between late 2004 and their corresponding peaks of 2012 and 2013, compared to 10 times and 13 times respectively for mining investment. The gentler rises in employment have

reflected two factors: 1) the presence of a required minimum level of operational mining employment prior to the investment boom, and 2) the high capital to labour ratio of LNG projects relative to other types of commodity projects.

Moreover, in the post-mining boom period, mining employment so far has not fallen to the same extent as mining investment, especially in the case of Queensland where the investment cycle is more progressed. This is due to an increase in operational jobs in Queensland as a result of a number of major coal projects. The labour intensity of coal projects in the operational phase relative to the construction phase is higher than for iron ore and LNG projects. Based on the estimates in the *Resources and Energy Major Projects* publication by the Department of Industry, the ratio of employees required in the construction to operation phase for coal projects is around 3:2, while it is around 2:1 and 5:1 for iron ore and LNG projects respectively.

Overall, we expect further net falls in mining employment in both states as the reduction in construction jobs outpaces the increase in operational jobs. Most of the job cuts in the mining sector going forward are likely to stem from WA for a number of reasons: 1) WA's mining investment and employment cycles are currently less progressed than Queensland, 2) WA accounts for a larger share of total investment and employment in the country, and 3) the labour intensity of commodity projects in their operational phase in WA is lower than in Queensland. The relatively more concentrated industry structure of WA also renders it to be more vulnerable to a prolonged period of subdued economic and labour market activity as a result of the mining downturn. That said, the fact that investment in Queensland has fallen more sharply than employment also points to a substantial adjustment in the Queensland labour market to come.

Mining Employment Outlook

Our earlier discussion on mining investment concluded that we are a little over half-way through the unwinding mining investment cycle. In terms of mining employment, our analysis using our mining investment and export forecasts and their relationship with mining employment suggest that the employment cycle is lagging the investment cycle slightly and is currently just under half way through the downturn. We expect approximately 50k more mining jobs to be shed, which is expected to bottom

out in the next 2½ years (before starting to recover). **This is likely to consist of around 65k construction jobs (to stabilise slightly above the levels seen in 2004-05), offset by a 15k increase in operation-related jobs, while exploration jobs are expected to stay largely unchanged or fall only marginally.** As a consequence, the equilibrium level of mining employment in 2019 is likely to be higher than the pre-boom era at around 170 to 180k persons, reflecting the increase in operation-related employment.

To put these estimates into context, we expect employment growth for the next few years to average around 18k persons per month, and if our growth figures are correct, the further mining job loss of around 50k predicted should be offset by other jobs created within the domestic labour market. Furthermore, the job losses are expected to take place relatively gradually over the next few years, which should be manageable at the national level. There are however certain geographical regions and specialised skill groups which will be disproportionately affected due to structural “mismatches”.

At the same time, the larger-than-expected declines in commodity prices from their 2014 levels and the likely prolonged nature of the low-commodity price environment has restricted the number of new projects announced. This suggests that mining investment will fall by more than otherwise would be the case. Also, there has been evidence to suggest that many mineral and petroleum producers have responded to the commodity downturn by resorting to a series of cost-cutting programs, including a reduction in their

headcount. According to the Department of Industry, the development of a number of iron ore projects has been stalled as a result. The data on total mineral and petroleum exploration expenditure from the ABS also highlights that actual expenditure has consistently fallen below expected expenditure by producers from December 2014 to December 2015, while total metres drilled declined by 8% in 2014-15. This is consistent with the observation that many producers have cut back on their exploration programs, especially at greenfield sites. **Based on the above, there is likely to be very little upside to mining investment and employment going forward.**

That said, the overall Australian economy has weathered the effects of the mining slowdown relatively well so far and continues to be one that grows moderately, with unemployment forecast to fall further. Growth has been particularly concentrated in services sectors which are more labour intensive and in the eastern states, and this pattern is likely to continue. **We expect the unemployment rate to ease gradually to 5.6% by end-16 and stabilise around that level until end-2017, before inching up in 2018.**

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