



The mining productivity opportunity

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Productivity is fundamentally important to the mining industry, delivering additional economic value and the operational resilience needed during commodity downturns. Perhaps most importantly, the social and environmental expectations on the mining industry will need to be funded through productivity gains.

In 2019-2020, according to the Federal Office of the Chief Economist, Australia's resources industry contributed ~\$290B to the economy, accounting for over 70% of export revenues, up from <\$40B in 1990 and 40% of export revenues. This extraordinary growth has been fuelled by Asian demand and enabled by large capital investments.

The Australian mining boom's transition to the production stage came after a period of significant investment in the resources sector, in which more than \$400B of mining, energy and infrastructure projects were developed in Australia. Over this same period (1990-2019) the mining industry's multi-factor productivity has declined by 25% (Fig. 1), labour productivity has not improved, significantly lagging the broader economy (Fig. 2) and the capital to output ratio has doubled (Fig. 3).

Productivity is the measure of production efficiency. At a national level it captures the economy's ability to 'harness its physical and human resources to generate output and income'. Productivity is often confused with production. Productivity is the measure of how efficient the production process is. It is determined when assessing per unit output derived from per unit inputs in the production process. Multi-factor productivity (MFP) reflects the overall efficiency with which labour and capital inputs are used together in the production process.

An often-quoted summary of the importance of productivity growth is that of distinguished US economist Paul Krugman, "Productivity isn't everything, but in the long run it is almost everything." A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker. World War II veterans came home to an economy that doubled its productivity over the next 25 years; as a result, they found themselves achieving living standards their parents had never imagined. Vietnam veterans came home to an economy that raised its productivity less than 10% in 15 years; as a result, they found themselves living no better - and in many cases worse - than their parents.

While some of the decline in mining productivity can be attributed to declining resource quality and the effort of accessing deeper deposits, this does not account for all of the regression in productivity. Productivity is a priority and technology alone will not address the fundamental productivity challenge and the underlying shortcomings in capital efficiency and labour productivity.



Technology

Australia has unique resource endowments, business and research capabilities, a skilled workforce and regulatory conditions which can be leveraged to develop new industrial capabilities and promote market diversity in resource value chains.

Embracing the use of digital technologies in Australia's resources industries could, if well managed, add \$74B in value to the Australian economy and create over 80,000 new jobs by 2030.

Interoperability

Interoperability will play an important role, reducing the cost of integration and lowering barriers to a more diverse supplier base. Advancements in physical extraction processes supported by digital solutions will be needed to deliver the productivity gains.

Australia can lead on the transparency and environmental, social and governance (ESG) fronts. This will be important for access to capital, access to premium markets and collaborative community solutions.

Collaboration

The case for collaboration is compelling. It is essential that we, as an industry, collaborate more effectively within and across industries to build a resilient ecosystem with the critical mass to support the transformation of Australia's resources industries, supported by local companies. This can be achieved by bringing together the mining, oil and gas, agriculture, forestry, government and METS sectors to support Australian companies that can be scaled across industries.

We should not be thinking about industry specific clusters but rather capability clusters that can be leveraged across industries.

Capabilities

There is significant overlap in the foundational technologies and capabilities that will support the future productivity gains of the resources sector. While the industry specific tasks will vary, there is commonality in sensors, communication, maintenance, machine vision, robotic control systems and the core capabilities of people that develop and utilise these technologies.

While mining is a large industry in Australia, on a global level it is small. For example, there are 1.2B motor vehicles globally - UPS, the parcel delivery company, has over 1.2M vehicles in its delivery fleet alone. The mining industry globally has around 88,000 pieces of mobile equipment. This is a tiny market to attract researchers, start-ups, investors, technology companies and talented people at scale.

The current mining ecosystem is too fragile to drive sustained innovation and too disconnected to support the technology enabled transformation that the mining industry needs to improve its safety, environmental and productivity performance.

Improving Productivity

We need to better co-ordinate the existing capabilities between industries, technology suppliers, governments, universities and research institutions. Comprehensive studies by Minerals Council of Australia, CSIRO and METS Ignited, AlphaBeta, Future Batteries CRC, and the agricultural sector point clearly to the work needed to address the capability gaps in the resources sector. Canada has developed a plan for increasing the export of valuable research, intellectual property and talent abroad, thus bringing diversity to its economy and also growing its service exports and value. We need to proactively address the likelihood of outsourcing Australia's productivity opportunity to international technology companies.

Figure 4 illustrates the productivity opportunity for Australian mining industry. Labour productivity in the mining industry significantly lags the broader Australian economy and in comparison, to mining, global manufacturing has accelerated labour productivity four times faster, through application of technology and deployment of digital skills. Learning from the manufacturing industry provides a blueprint on how to consistently improve productivity.

To improve productivity, we must continue to grow the efficiency of resource extraction and the scale of Australia's service sector by capitalising on innovation and supporting local businesses that will upskill and grow multi-industry local workforces. This will not only strengthen technology transfer and economic benefit but also increase the range of services and the amount of value-add work across mining, oil and gas, agriculture and forestry. In turn, this will support the diversification of the Australian economy. ■

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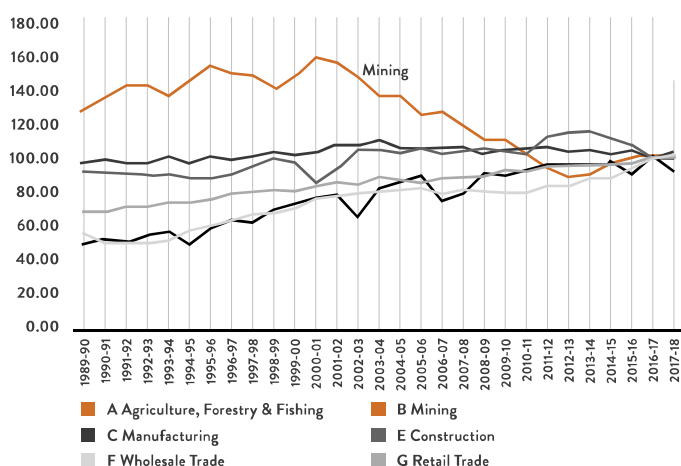


Figure 1: ABS (2018) - Estimates of Industry Multi-factor productivity. Australian System of National Accounts 2017-2018.

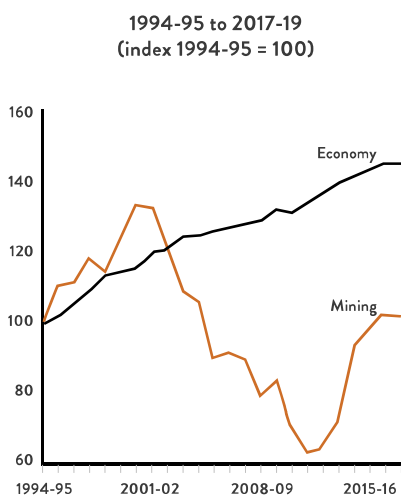


Figure 2: <https://data.oecd.org/lprdy/labour-productivity-and-utilisation.htm#indicator-chart>. Source: ABS (2018, Australian System of National Accounts, 2017-18).

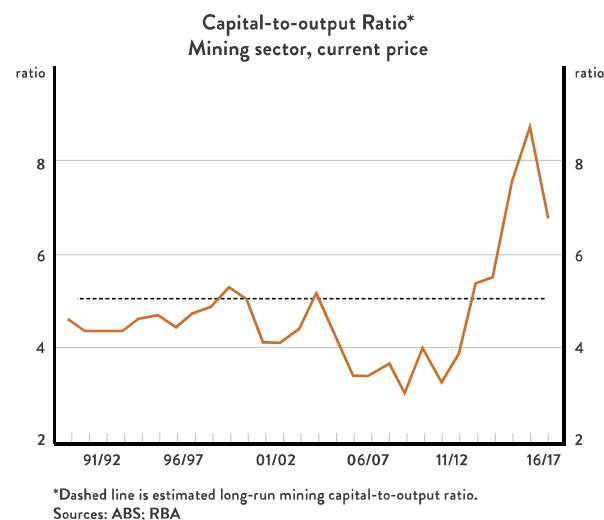


Figure 3: www.aphref.aph.gov.au_house_committee_economics_productivity_report_chapter%202.pdf

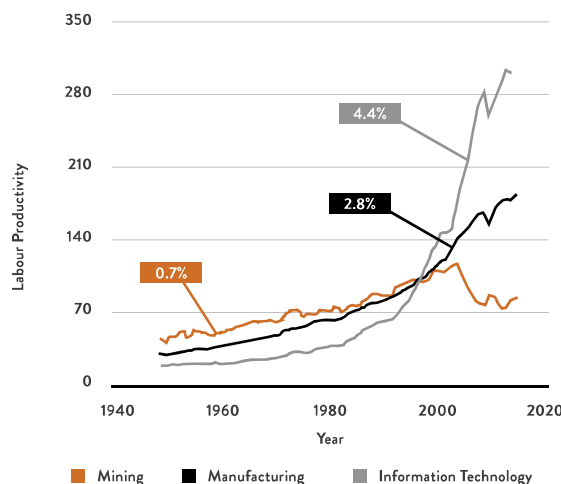


Figure 4: Bartos P.J., Resource Policy, 32, 2007, pp 149-158, and US Department of Labor 2015