Measuring Productivity in the Australian Mining Sector

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Outline

1. Australian Productivity Performance
2. Mining Productivity Measurement Issue
3. Mining Productivity Growth (results)
4. MFP decomposition
5. Mining Cost Pressures
6. Implications and conclusions
Objective of the study


- The study analyses the productivity growth in the mining sector in Australia at the national, regional and sector levels. The period of analysis is 1985-86 to 2009-10, but a productivity estimate for 2010-11 is also provided.

- The study also examines the nature of technology change and input use prevailing in Australian mining.
Productivity growth

• Productivity of an input is given by the average ratio of output per unit of input.

• Multifactor factor productivity (MFP) is measured in terms of real output per unit of labour and capital.
Australian Mining Sector: Trends

Since the 2000s, there has been significant growth in the Australian mining sector.

• Resource exports accounted for 60 per cent of total Australian exports in 2012 compared to 35 per cent in the 2000s, and were close to $200 billion in 2012.

• In 2011-12, investment in new capital expenditure in the mining sector was 53 per cent of private new capital expenditure and was valued at $82 billion.

• The rates of growth in prices increased from 1 per cent a year over the 1990-2000 to 9 per cent a year over 2000-10.
Australian Productivity Performance

• Australia’s productivity performance deteriorated in the 2000s relative to the 1990s.

• Most of the slowdown in Australia’s productivity performance attributable to two sectors: mining; and electricity generation, water & waste services (EGW & WS).
Figure: MFP growth in Australia, selected sectors, average annual growth, 1985–86 to 2009–10

Source: BREE 2012, ABS 2011 data
Figure: Growth in labour productivity, capital productivity and MFP in the Australian mining sector, 1990–91 to 2009–10

Source: BREE 2012
Cross-Country Comparisons

Figure: Labour, capital and MFP productivity growth, 1989-90 to 2006-7

Source: Bradley and Sharpe, 2009
It seems that the slowdown in Australian mining productivity may relate to the,

- input-output lags;

- the transition to extraction of deeper ores and lower-yielding resources;

- lumpy nature of mining investment;

- the unpredictability of commodity prices;

- inappropriate mix of production inputs; and

Many of these factors work together, and influence each other.
Mining productivity measurement issue

• Conventional measures of MFP not appropriate with declining output quality (grade of ore).

• Unadjusted productivity measures that fail to account for depletion or output lags misrepresent the actual trend in productivity growth in the mining sector.
Results: Unadjusted and adjusted MFP growth, (per cent per year) for Australian mining, 1985-86 to 2009-10

Source: BREE estimates
Technological change, input bias, and Decomposition of MFP Growth:
Technical progress (TP), Technical Efficiency (TE), Scale Effects (SC), 1990-91 to 2009-10

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<tr>
<th></th>
<th>TP (%)</th>
<th>TE (%)</th>
<th>SC (%)</th>
<th>MFP (%)</th>
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<tbody>
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<td>Australian mining</td>
<td>-10.2</td>
<td>82.4</td>
<td>27.8</td>
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<tr>
<td>Capital and Labour</td>
<td></td>
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Source: BREE calculations
Key BREE findings

• BREE finds that after accounting for the influences of depletion and production lags, the multi-factor productivity (i.e. the combined productivity of labour and capital) growth rate in Australian mining increases from an average annual rate of negative 0.65 per cent (unadjusted) to positive 2.5 per cent between 1985-86 and 2009-10.

• After adjustment, MFP growth was higher in each state and sector, than before adjustment.

• Both technical efficiency (catching up with the high performers by, among other things, adopting better existing technology) and scale effects contributed positively and significantly to Australian mining MFP, after removing the effects of depletion.

• Despite cost rises, Australia is still an attractive destination for mining.

Source: BREE Discussion Paper, Productivity in the Australian mining sector, March 2013
Policy Implications

• Deteriorating productivity in Australian mining is the result of strong resource prices, profitability and increased extraction of deeper or lower grade ores.

• Results indicate that industry-specific policies to boost productivity are likely not needed.
**Innovation and technical progress**

- Innovations and technological progress are key drivers of productivity growth over the long term.

- The cost of digging deeper and processing ores can be reduced by better machinery and equipment.

- Growth in innovations, a more skilled workforce, a faster rate of adoption of better off-the-shelf technologies as well as new technological breakthroughs would all likely assist in productivity growth of the Australian mining sector.
Australian mining income and expenses

- Costs and income are rising in both nominal and real terms in the Australian mining sector, but total income is rising at a faster rate than total expenses.

- Mining profits rose from 2003-04 to 2010-11. This implies that the ratio of total operating expenses to total income has fallen.
Further Details:

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