

McKinsey Global Institute



August 2012

# Beyond the boom: Australia's productivity imperative



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# Beyond the boom: Australia's productivity imperative

Charlie Taylor  
Chris Bradley  
Richard Dobbs  
Fraser Thompson  
Daniel Clifton

# Preface

With a strong banking sector and an enviable unemployment rate hovering just above 5 percent, Australia stands among the fortunate few advanced economies that are currently generating significant income growth. An outsized boom in the resources sector, driven by demand from developing nations in Asia, has led to a surge in income from record export prices and historic levels of investment. But the boom belies a clear decline in Australia's productivity.

The sheer scale of the expansion in mining and energy makes it more difficult to assess the long-run performance and prospects of the economy as a whole. Typically labour productivity is a useful measure of performance and is rightly a focus of national policy. But Australia's recent investment boom has changed the growth equation, placing greater emphasis on the role of capital productivity. Drawing on expertise from 20 years of productivity studies, including a 1995 report on the Australian economy, the McKinsey Global Institute aims to create an analytical framework that acknowledges the complex structural shifts currently under way. This report develops a new method of "growth accounting" that emphasises the distinct roles of capital and labour while also separating the terms of trade (especially rising commodity prices) from output.

How to maximise the benefits of the current resource windfall to Australia's public finances is already a heated topic. While we completely agree that this is an important issue, attention must also focus on ensuring that the nation's underlying prosperity continues. If it doesn't, discussion of how to spend the windfall will be moot. By shoring up productivity *now*, while the benefits of the boom are still accruing, business and policy leaders can position Australia to better withstand external risks beyond its control.

Charlie Taylor, head of McKinsey's Public Sector Practice in Australia, and Richard Dobbs, a director of MGI, oversaw the project. This project was led by Chris Bradley, a partner in McKinsey's Sydney office, and Fraser Thompson, an MGI senior fellow, supported by a project team in McKinsey's Australia office of Ben Austin, Daniel Clifton, Alice Hudson, and Jonathan Humphrey.

We are grateful for the advice and input of many McKinsey colleagues, including Nigel Andrade, Angus Dawson, Parag Desai, Emiliano Di Vincenzo, Ryan Geraghty, Brett Grehan, Jasper van Halder, Duncan Kauffman, Olivier Legrand, John Lydon, Tim McEvoy, Gary Pinshaw, David Pralong, Michael Rennie, and Joseph Tesvic.

Many experts in academia, government, and industry have offered invaluable guidance and suggestions. Our particular thanks go to Martin Baily, Gordon Cairns, Andrew Charlton, Richard Cooper, Diane Grady, Warwick McKibbin, Robert McLean, Mick Reid, and John Stuckey.

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This report contributes to MGI's mission to help leaders understand the forces transforming the global economy, improve company performance, and work for better national and international policies. As with all MGI research, we would like to emphasise that this work is independent and has not been commissioned or sponsored in any way by any business, government, or other institution.

**Richard Dobbs**

Director, McKinsey Global Institute  
Seoul

**James Manyika**

Director, McKinsey Global Institute  
San Francisco

**Charles Roxburgh**

Director, McKinsey Global Institute  
London

**Susan Lund**

Director of Research, McKinsey Global Institute  
Washington, DC

August 2012

# *Past performance*

6th

among OECD countries in GDP  
per capita ... up from 16th in 1990

58%

of income growth since  
2005 has been driven by  
temporary boom factors

35% of income growth came from resources ...  
but so did

99%

of the drop in  
capital productivity

0.7%

annual decline in productivity  
between 2005 and 2011 ...  
compared with a 2.4% increase  
from 1993 to 1999

# *Threats and opportunities*

If the boom slows and productivity doesn't improve, income growth could potentially drop to

**0.5%**

Investment in the resources sector could rise between 50% and

**170%**

National income could be

**A\$90 billion**

higher by 2017 if productivity is restored to long-term averages ... while up to

**A\$135 billion**

of 2017 income depends on continued strength in investment and terms of trade







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## Executive summary

Although they may not always feel it, Australians are more prosperous than ever. As recently as 1990, the nation ranked 16th among OECD countries in terms of per capita GDP; just two decades later, in 2010, it stood in sixth place.<sup>1</sup> Australia overtook the United States in terms of income per head back in 2005.

Capitalising on its geography and geology, Australia has been riding the wave of Asia's rapid growth, providing many of the raw materials used to power new industry and build the vast infrastructure needed in China and other emerging markets. As commodity prices have spiked in recent years, Australia has attracted a flood of investment into its mines, processing plants, pipelines, and ports—in fact, there has been greater investment in resource projects over just the past five years than in the previous 20.

Asia's economic and demographic trends point to sustained demand in the decades ahead, but growth fuelled by natural resources carries risk. Australia's reliance on its resource sectors could leave the economy vulnerable to any growth slowdown in China, volatility in commodities markets, and the eventual normalisation of resource prices when supply catches up with demand (or potentially a precipitous drop in resource prices if supply gets *ahead* of demand).

The boom also belies some weaker fundamental trends in the economy that could put Australia's future prosperity at risk unless they are addressed. Notably, growth in labour productivity has fallen to 0.3 percent per annum in the last six years, down from an average of 3.1 percent from 1993 to 1999. This slowdown has taken place at a time of significant wage inflation, with average private-sector weekly earnings growing at 4.4 percent per annum over the same period. Lacklustre labour productivity growth is all the more striking in light of the substantial capital deepening that has taken place in the Australian economy. The amount of capital per hour worked is 25 percent higher today than it was six years ago—yet workers on average are producing only 7 percent more output per hour. Moreover, capital productivity is now a drag on income growth. Improving productivity performance is imperative if Australia hopes to prepare for a future that may not offer the tonic of record investment and export prices.

In this report, we first use a new MGI model for income growth accounting to explore the current dynamics of the Australian economy. We then discuss potential scenarios for future growth through 2017, and home in on individual sectors of the economy to analyse their key growth drivers and better understand what businesses and policy makers might do to maximise productivity and income growth.

We now summarise our main findings.

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<sup>1</sup> Among nations in the Organisation for Economic Co-operation and Development. Based on per capita GDP, adjusted for purchasing power parity (PPP), using OECD national accounts.

## AUSTRALIA'S CURRENT INCOME GROWTH IS BEING DRIVEN BY A NUMBER OF ONE-OFF FACTORS

The magnitude of the resources boom has distorted perceptions of the economy's overall health. Since 2005, Australia's income has risen 4.1 percent per year, a pace consistent with recent history.<sup>2</sup> But a closer look reveals some troubling trends: Australia has enjoyed this prosperity despite a decline in multifactor productivity of 0.7 percent per year. Indeed, without the one-off factors of an investment surge and high commodity prices, Australia's brisk income growth would have been cut in half—well below what has historically been achieved.

Among the dynamics now at work:

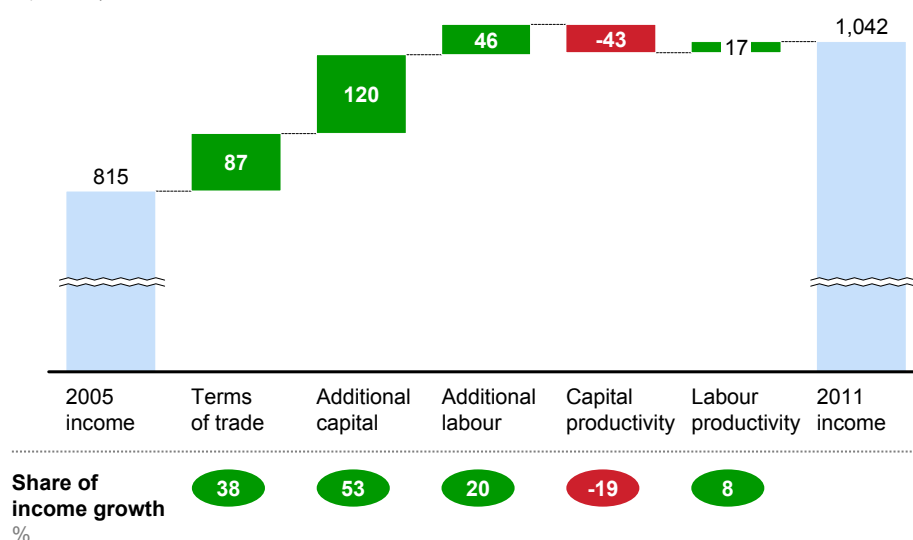
- Capital investment and the terms of trade, not productivity, are driving growth.** Before the resources boom, productivity delivered at least half of Australia's income growth. But since 2005, both capital and labour productivity have fallen dramatically. More than 90 percent of income growth now comes from Australia's favourable terms of trade (especially the increase in resource prices) and the associated surge in capital investment (Exhibit E1). The terms of trade may be a simple ratio between the prices of Australia's exports and the prices of its imports—but a powerful story is embedded within this number. Historic highs in Australia's terms of trade reflect China's newly voracious appetite for coal and ore, which sent prices for these commodities soaring, as well as the steady flow of cheap manufactured goods shipped from Chinese factories to the Australian consumer.

### Exhibit E1

#### New capital and terms of trade have driven income growth since 2005

Gross domestic income (GDI), market sectors, 2005–11

A\$ billion, real 2010



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

<sup>2</sup> This report uses a measure of income called gross domestic income (GDI), which includes the terms of trade. We focus on income rather than GDP in this report to reflect the reality that an economy earns more when it receives higher prices for the goods that it exports and that effective incomes are higher when goods that an economy imports become cheaper, giving consumers greater spending power. For detail, see the appendix, section D, "Measuring Australia's income".

- **10 percent of the economy has driven a third of recent income growth.** Since 2005, a third of Australia's income growth has been generated by a resources sector that accounts for 10 percent of the nation's output and just 3 percent of its direct labour. Resources have absorbed 64 percent of the terms of trade improvement and half of the investment increase. This shift in emphasis has caused huge disparities among both sectors and regions.
- **More than half of recent income growth is due to temporary boom-time effects.** Underlying growth in income is not as significant as the headline number suggests. The biggest one-off impact has been an A\$87 billion boost from the terms of trade, but capital deepening (an increase in capital per hour worked above historical rates) also gave an A\$39 billion boost.
- **Capital productivity is the biggest drag on growth.** Capital productivity actually lowered income by A\$43 billion from 2005 to 2011, or A\$53 billion when including the impact of a shift in capital to more productive industries. While A\$24 billion of the deterioration can be explained by large investments sunk in projects that have yet to be completed and A\$13 billion represents declining yields (a factor that cannot be controlled), A\$16 billion in income has been lost economy-wide since 2005 to higher costs and inefficiencies (which can be at least partially addressed).

## **IF PRODUCTIVITY GROWTH DOESN'T RECOVER, AUSTRALIA MAY HAVE LITTLE OR NO INCOME GROWTH IN THE FUTURE**

The Australian economy has enjoyed uninterrupted annual growth for more than two decades, but that track record is not guaranteed to last. Future income growth hinges on two major factors: 1) the duration and intensity of the resources boom; and 2) productivity growth. This report examines likely high and low projected outcomes for the major drivers behind these two factors and then builds four scenarios based on possible combinations of these results to illustrate a range of potential impacts on Australia's future income growth.

The best possible scenario involves productivity growth returning to its longer-term average, the current terms of trade being maintained, and all advanced capital projects plus three-quarters of less advanced projects coming onstream. Even then, our projections suggest that income growth would amount to 3.7 percent, weaker than its historical rate of 4.1 percent.

But the worst-case scenario is sobering. It involves the terms of trade trending toward their long-term average, only two-thirds of advanced capital projects and one-third of less advanced projects coming to fruition, and no improvement in recent productivity growth. Under those conditions (and excluding any dynamic economic feedback loops that may result from the scenario), there is a risk that Australia could see only 0.5 percent income growth to 2017 (Exhibit E2).

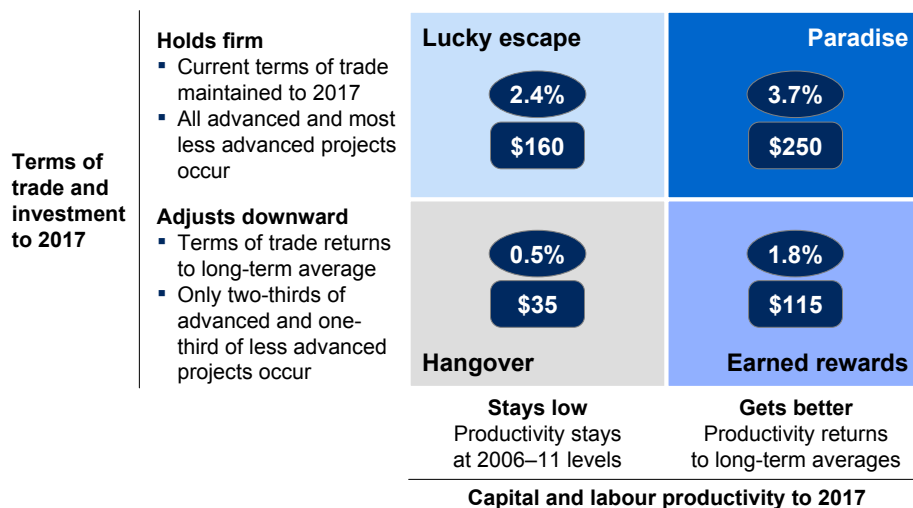
## Exhibit E2

### Four scenarios illustrate a range of potential outcomes

Scenarios for annual growth in GDI, 2011–17<sup>1</sup>

○ Income growth rate  
%

○ Income growth<sup>2</sup>  
A\$ billion



<sup>1</sup> Adjusted for lagged returns from capital recently added.

<sup>2</sup> Difference in income between 2011 and 2017, rounded to the nearest A\$5 billion.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

Looking ahead to 2017, national income could vary by up to A\$135 billion depending on the direction of the terms of trade and the strength of associated investment trends—but unfortunately, Australia cannot control the intensity and duration of the resources boom. It *can*, however, take steps to boost productivity. Although slower income growth is probably unavoidable, improved productivity can ensure a much softer landing if and when the resources boom abates. Returning to good productivity performance can add A\$90 billion to national income by 2017.

## CAPTURING THE A\$90 BILLION PRODUCTIVITY PRIZE REQUIRES ACTION IN FOUR SECTOR CLUSTERS

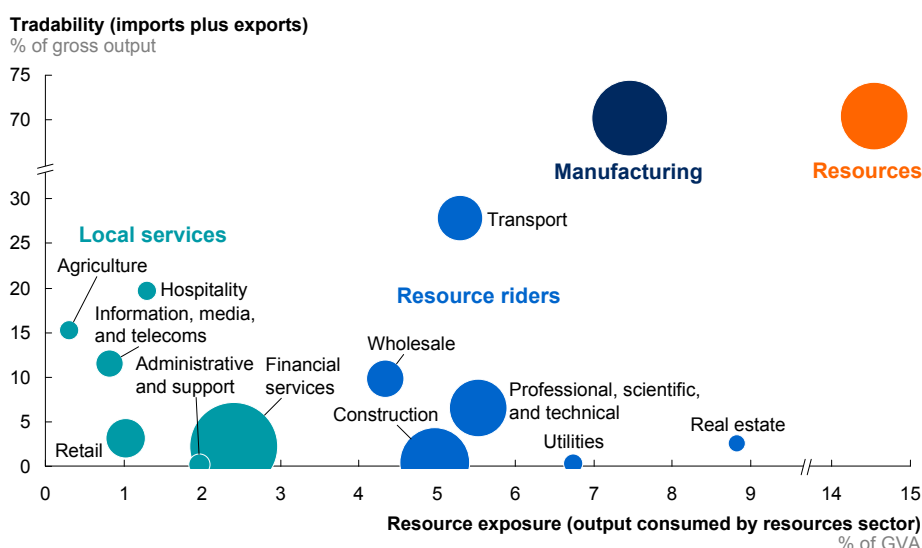
Before a serious productivity push can begin, it is crucial to understand the particular nature of the challenges facing individual sectors.

Conventional wisdom says that Australia has a two-speed economy: a thriving resources sector versus all other sectors, which are growing more slowly. But our analysis finds it more useful to describe Australia as a four-part economy, with clusters defined by their proximity to the resources boom and their exposure to trade competition (Exhibit E3). When the productivity challenge is viewed through this lens, priority areas for future action begin to come into focus.

### Exhibit E3

#### Sectors group into four clusters based on their links with resources

○ Size of bubble reflects  
sector Gross Value  
Added in 2011



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

1. **Resource sectors: Drive capital productivity to make good on investment.** Resource sectors have experienced rapid growth but falling capital productivity. Some A\$40 billion in new net capital stock was added in 2011, a number projected to rocket to A\$71 billion in 2012 and past the A\$100 billion mark in 2013. We estimate that Australia is less than halfway through the capital boom; even the lowest projection used in the scenarios for future income growth illustrated in Exhibit E2 predicts that investment in the resources sector over the next six years will exceed the already historic levels posted since 2005. This underscores the urgency of getting capital productivity right; it is a priority area that can reap large rewards in future income growth.<sup>3</sup> Major capital projects are complex undertakings that are prone to inefficiencies and overruns, but the analysis reveals opportunities to boost performance by up to 30 percent. Both individual companies and policy makers can help capture these gains. There is a clear role for government in influencing the time and cost of major resource projects. This includes ensuring that environmental approvals, infrastructure development, and

<sup>3</sup> For further commentary, see Ed Shann, *Maximising growth in a mining boom*, Minerals Council of Australia, March 2012.

industrial relations deliver the right balance between development and other social good, and that regulators provide maximum clarity, certainty, and speed to companies while fulfilling their mandates.

2. **Resource rider sectors: Improve efficiency, especially in utilities.**

Resource riders, such as transport and professional services, have grown rapidly because of their links with the mining and energy boom, but at the same time, they have experienced a decline in productivity. These sectors attracted the vast majority of the overall economy's increase in labour from 2005 to 2011, but the contribution of labour productivity to sector output fell to virtually zero during this period. This stagnation is especially notable because it occurred in spite of 37 percent growth in net capital stock between 2005 and 2011. Finding new ways to make infrastructure development more cost-efficient and adopting a more integrated cross-sector approach to resource productivity that can reduce the need for expensive new infrastructure will be crucial.

3. **Local services: Recommit to microeconomic reform.** Sectors such as retail trade and telecommunications have been largely unaffected by the resources boom and have posted solid productivity growth (albeit with gaps to international benchmarks). This cluster contributed A\$49 billion to income growth in 2005 to 2011. But there is room for further gains, given the average productivity gap of A\$32 per hour with the equivalent US sectors from 2005 to 2010. MGI research shows that new operating models within individual companies and sectors (automating supply chains, for example) can boost productivity, as can actions by governments to streamline regulation, encourage innovation, and promote competitive markets. To close the gap, Australia needs to re-embrace the cause of microeconomic reform that drove growth in the 1990s.

4. **Manufacturing: Build the foundation for long-term competitiveness.**

Like other developed economies, Australia has experienced a long-term erosion in manufacturing output and employment. Capital productivity has fallen significantly over the past six years and has been only partly offset by gains in labour productivity. But the decline has not been uniform across all subsectors. Unsurprisingly, the subsectors facing the greatest threat from low-cost overseas producers have posted the greatest job losses and the greatest productivity increases. At the same time, productivity growth in more innovative manufacturing sectors has lagged below international benchmarks. Improvement will depend on three factors: further cost efficiencies in those subsectors that compete primarily on price (with a particular focus on the neglected area of management quality); higher labour mobility within the manufacturing sector; and a more supportive ecosystem for innovative manufacturing (the area in which Australia has the best long-term potential to be competitive).

Successful action along these lines could deliver additional national income of up to A\$90 billion a year over and above a business-as-usual scenario by 2017.





Thanks to the resources boom, Australia has had strong growth but has also been able to avoid confronting some deteriorating fundamental trends, a luxury that it cannot afford indefinitely. This report describes both the challenge now facing the economy and the size of the prize if productivity is improved. We hope it will also contribute to a constructive debate on the best way to capture that prize and build a more balanced, resilient Australian economy.

# 1. The shifting drivers of income growth

Australia has been largely immune from the high unemployment, sluggish growth, and banking woes that plague other developed economies. It now ranks sixth among OECD nations in GDP per capita, a huge gain from its 16th-place standing in 1990. In terms of income per head, Australia overtook the United States in 2005.

The world's leading exporter of coal and iron ore, Australia is also a major source of minerals such as bauxite, alumina, lead, uranium, and zinc. In addition, the presence of huge reserves and the development of coal seam gas have raised hopes that Australia will soon become a leading global supplier of natural gas. Investment has flooded into the booming resource sectors.

Below the headline figures, however, lurk some worrying trends. Since 2005, income has risen 4.1 percent per year, a pace consistent with recent history.<sup>4</sup> But that growth has been due to Australia's ability to capitalise on its natural endowments of resources at a time of soaring demand from Asia's emerging economies. If not for extremely positive terms of trade and high capital investment, both of which are temporary factors, income growth would have been only half as strong—coming in well below its historical rate. Productivity, the traditional driver of growth, has been weakening to the tune of 0.7 percent a year.

## OVER THE LAST TWO DECADES, PRODUCTIVITY HAS BEEN ECLIPSED AS THE DRIVER OF GROWTH

Australia has enjoyed two decades of brisk income growth. This time frame spans three distinct periods marked by shifts in the dominant contributors that produced a 4 percent annual growth rate (Exhibit 1).<sup>5</sup>

- **“Golden age.”** Between 1993 and 1999, Australia reaped the dividends from major economic reforms begun in the 1980s, including floating the dollar, liberalising banks, dismantling wage fixing, reducing tariffs, and granting independence to the central bank. Supported by these reforms, multifactor productivity growth increased at an impressive annual rate of 2.4 percent.
- **“Riding momentum.”** The years from 1999 to 2005 saw a slower pace of economic reform and productivity growth decelerating to 0.9 percent. But the terms of trade began to improve, helping to bridge the resulting income gap. This era was characterised by all income factors reverting to roughly their trend levels.
- **“Capital boom.”** A remarkable surge in investment and the terms of trade became the engines of Australia's growth from 2005 to 2011. But the

4 This paper uses a measure of income called gross domestic income (GDI). GDI includes the terms of trade and is thus a more complete measure of the economy's well-being than more frequently used measures of production (e.g., GDP, GVA).

5 For detail, see the appendix, section D, “Measuring Australia's income”.

prosperity generated by the boom camouflaged underlying problems, as productivity growth declined to negative 0.7 percent per annum.

## Exhibit 1

### Australia has grown through three recent eras

Compound annual growth rate, real values, 1993–2011  
%

■ Above trend<sup>1</sup>  
■ Trend<sup>1</sup>  
■ Below trend<sup>1</sup>

		Golden age 1993–99	Riding momentum 1999–2005	Capital boom 2005–11
Income drivers	Income <sup>2</sup>	4.2	4.0	4.1
	Capital stock	2.9	3.6	5.4
	Hours worked	2.3	1.4	1.5
	Multifactor productivity	2.4	0.9	-0.7
	Terms of trade	0.2	4.2	7.7

1 Based on average growth, 1960–93.

2 Gross domestic income.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

## TERMS OF TRADE AND CAPITAL INVESTMENT—BOTH EXPERIENCING TEMPORARY SPIKES—EXPLAIN MORE THAN 90 PERCENT OF RECENT INCOME GROWTH

MGI's analysis looks at the five factors that determine income:<sup>6</sup>

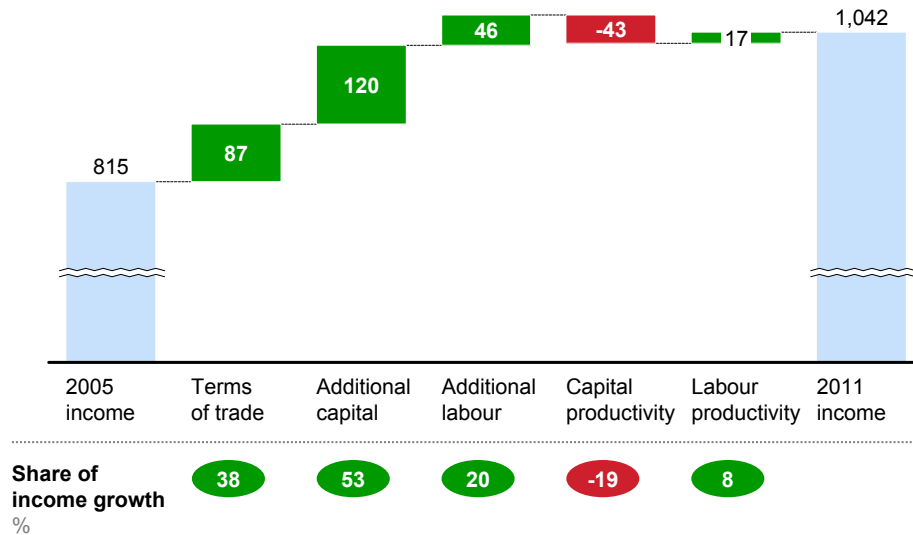
1. **Terms of trade:** The effect of changing prices for imports and exports
2. **Additional capital:** The increase in capital stock
3. **Additional labour:** The increase in the total number of hours worked in the economy
4. **Capital productivity:** The amount of output generated per unit of capital stock
5. **Labour productivity:** The amount of output generated per hour worked

Australia's income has risen from A\$815 billion in 2005 to just over A\$1 trillion in 2011. More than 90 percent of this growth is attributable to a significant improvement in the terms of trade and to a surge in capital investment (Exhibit 2). Declining productivity in aggregate actually reduced income by 11 percent, while a steady expansion in hours worked explains the remaining 20 percent of growth.

6 These growth decompositions typically focus solely on labour productivity—or, in some cases, on multifactor productivity. However, we found that focusing exclusively on labour productivity is misleading in the Australian context because this metric doesn't take into account the fact that the typical Australian worker now has 25 percent more physical capital available per hour worked than in 2005. For more on the productivity measurements used in this report, see the appendix, section A, "Measuring productivity: Splitting capital and labour".

**Exhibit 2****New capital and terms of trade have driven income growth since 2005**

Gross domestic income (GDI), market sectors, 2005–11  
A\$ billion, real 2010

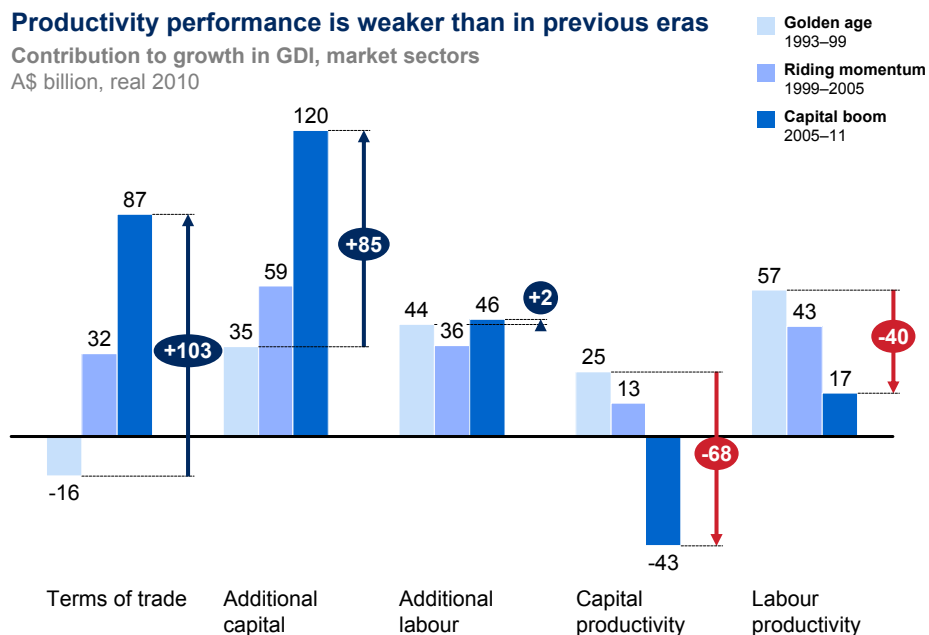


SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

The contributors to income growth have changed significantly since 1993 (Exhibit 3). While labour growth was one steady trend during all three periods, capital and labour productivity together caused a negative A\$108 billion swing in income between the golden age (1993–99) and the recent capital boom era (2005–11). In the golden age, capital and labour productivity accounted for A\$82 billion of income; during the capital boom, they caused an A\$26 billion deterioration (labour productivity slowed to make a weak but still slightly positive contribution, while capital productivity became an actual drag on income). The two major accelerators of growth have been the terms of trade and capital, which together explain an A\$188 billion swing in income between the periods 1993–99 and 2005–11.

**Exhibit 3****Productivity performance is weaker than in previous eras**

Contribution to growth in GDI, market sectors  
A\$ billion, real 2010



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

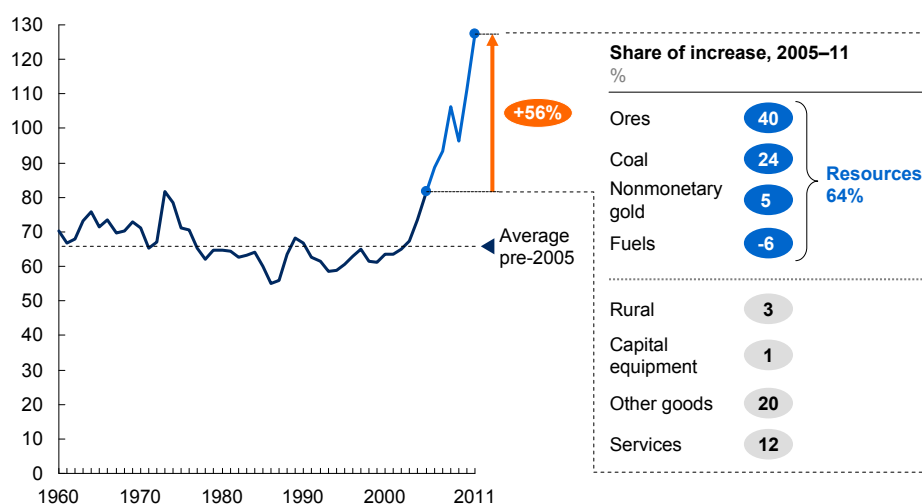
- Terms of trade.** Over the past decade, Australia has benefited from higher-than-usual prices for key exports, particularly mineral resources (Exhibit 4), while the cost of many of its imported consumer goods and capital equipment has fallen. Underpinning this shift is the extraordinary economic transformation in China and other emerging markets, which has created unprecedented demand for resources and lowered the price of imports (see Box 1, “The new resource era”). As Reserve Bank of Australia Governor Glenn Stevens noted, “In 2005, one shipload of iron ore going to China was worth 2,200 flat-screen TVs coming back the other way. Today, due to the surge in iron ore prices and falling price of TVs, one shipload of iron ore is equivalent to 22,000 TVs”.<sup>7</sup> However, the terms of trade dividend will not continue indefinitely. It would take an even further increase from already historically high levels to maintain an ongoing positive impact on income. In the more likely event that the terms of trade maintain current levels or even deteriorate (as per Treasury forecasts<sup>8</sup>), this driver will become neutral for growth at best. At worst, it could drive significant downward pressure on incomes, even if output in the resource sector continues to grow.

#### Exhibit 4

#### Resources have pushed Australia's terms of trade to unprecedented levels

Historical terms of trade

Index: 2010 = 100



NOTE: Numbers may not sum due to rounding

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

7 Glenn Stevens, “The challenge of prosperity”, address to the Committee for Economic Development of Australia annual dinner, November 29, 2010.

8 Budget paper No. 1: *Budget strategy and outlook 2012–13*, Australian government, May 2012.

### Box 1. The new resource era

During the 20th century, the price of key resources, ranging from wheat to steel to oil, fell by almost half in real terms, as measured by the McKinsey Global Institute's commodity index. This was astounding given that demand for different resources jumped from 600 to 2,000 percent as the world population quadrupled and global economic output increased approximately 20-fold. But prices declined thanks to technological innovation and the discovery of new, low-cost sources of supply. Moreover, in some cases, resources were not priced in a way that reflected the full cost of their production (because of energy subsidies or unpriced water, for instance) and externalities associated with their use, such as carbon emissions.<sup>1</sup>

The surge in demand from emerging markets such as India and China has reversed this 100-year decline in just a decade. Growth in these countries is happening on a scale and with a speed that has never before been witnessed. With a combined population of more than 2.5 billion, China and India are doubling real per capita income every 12 and 16 years, respectively. This is about ten times the speed at which the United Kingdom achieved this transformation during the Industrial Revolution—and on around 200 times the scale.

The fundamentals of future demand for Australia's raw materials look strong: the consuming class (urban residents with more than \$10 a day in income) will grow by a further one billion individuals by 2025, injecting \$20 trillion into the world economy.<sup>2</sup> As demand soars, the cost and difficulty of finding and extracting new sources of supply is also rising, notwithstanding technological improvements. This provides long-term support to resource prices.

However, with the exception of the energy shocks of the 1970s, the volatility of resource prices today is also at an all-time high. Dramatic swings have become the new norm. Compounding the challenge are stronger price and substitution effects among resources, increasing the risk that shortages and price changes in one resource can rapidly spread to others. While the fundamental drivers of the resources boom may be strong, Australia is more exposed to the risks of a complex, volatile market in the short term.

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1 *Resource revolution: Meeting the world's energy, materials, food, and water needs*, McKinsey Global Institute and McKinsey & Company's Sustainability and Resource Productivity practice, November 2011 ([www.mckinsey.com/mgi](http://www.mckinsey.com/mgi)).

2 *Urban world: Cities and the rise of the consuming class*, McKinsey Global Institute, June 2012 ([www.mckinsey.com/mgi](http://www.mckinsey.com/mgi)).

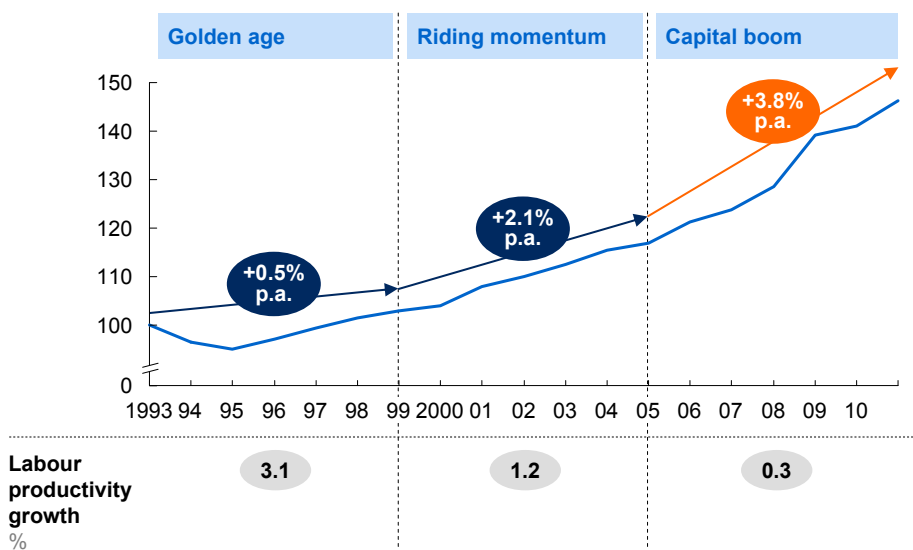
- Additional capital.** The most immediate result of Australia's favourable terms of trade has been a flood of new investment in sectors benefiting from higher international prices and demand. Multiple large-scale projects—including new mines, coal seam gas ventures, processing plants, and pipelines—are under way or on the drawing board, with many requiring sophisticated engineering and major construction. Over the 12 years from 1993 to 2005, the amount of capital invested per hour of labour increased by 1.3 percent annually, an effect known as capital “deepening”. By comparison, since 2005, capital has been added at a rate of 3.8 percent per year for each hour worked (Exhibit 5). By 2011, 25 percent more physical capital was available per hour worked than in 2005. The recent rate of capital deepening is rare for a developed economy and well above Australia's own long-term trend. While it could persist for some time into the future as resource companies continue to launch large projects, capital investment will eventually slow to its long-term averages (or potentially undershoot them) as resource markets come into balance. Capital investment has been vital to Australia's recent performance, but it cannot be fully counted upon to sustain growth in the future; the part that represents an aberration from long-term trends in capital per worker must be considered a “one-off”.

#### Exhibit 5

##### Capital intensity per hour worked began to take off in 2005

Net capital stock per hour worked

Index: 1993 = 100



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

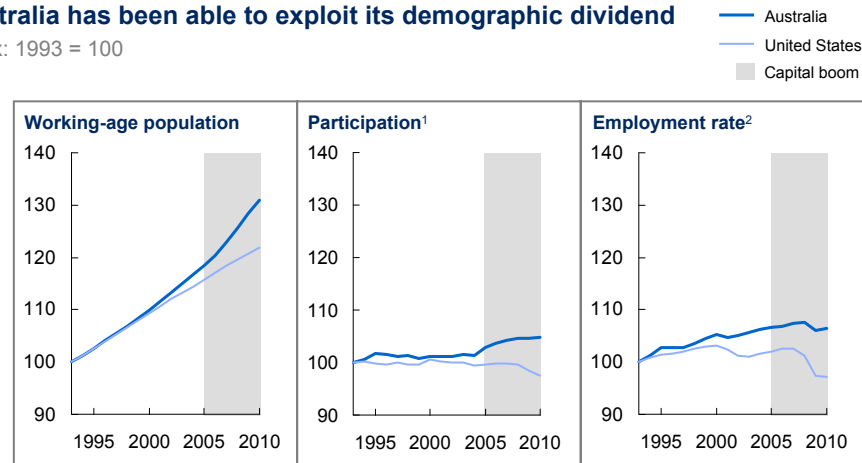
- Additional labour.** An expanding labour force has continued to be an important part of Australia's growth story (Exhibit 6). Since 1993, labour growth in Australia has been firing on all cylinders with a higher working-age population (which yields a demographic dividend as more people are available to work), a higher participation rate (more people looking for work), and a higher employment rate (more people able to find work). This is a stark contrast to the story playing out in other developed economies such as the United States, which has struggled with slow rates of growth in the working-age population, declining participation, and higher unemployment. Immigration is behind much of the increase in Australia's population: an average of 143,000 immigrants arrived each year between 1993 and 2011, compared with average annual population growth of 130,000 from natural increase. The quantity of labour has been the steadiest

contributor to Australia's modern growth, but this contribution is not guaranteed into the future given the nation's aging population.

### Exhibit 6

#### Australia has been able to exploit its demographic dividend

Index: 1993 = 100



Compound  
annual growth  
rate, 1993–2010  
%

1.6  
1.2

0.3  
-0.1

0.4  
-0.2

1 Defined as labour force/total working-age population.

2 Employment rate comprises all persons above a specified age who, during a specified brief period, were in either paid or self-employment, as a share of the labour force.

SOURCE: Organisation for Economic Co-operation and Development; McKinsey Global Institute analysis

- Capital productivity.** A large recent decline in capital productivity led to A\$43 billion in total lost income between 2005 and 2011 (or A\$53 billion including the impact of capital moving to more productive sectors). Ninety-nine percent (A\$42.5 billion) of this loss is attributable to the resources sector. Our analysis finds that A\$24 billion of the decline in productivity in the resources sector is due simply to the time lag between investments in major projects and the payoff realised once new capacity actually goes into production. It can take months or even years to complete planning, approvals, and construction on mines, wells, large-scale plants, pipelines, and transport networks, but these projects will eventually be operational. A further A\$13 billion of this income loss can be explained by yield depletion.<sup>9</sup> The remaining A\$5 billion capital productivity loss in the resources sector is driven by higher costs and inefficiencies, which can be at least partially addressed. This decline is a matter of growing urgency in light of the massive A\$443 billion pipeline of projects still to come.<sup>10</sup> We will explore this topic in greater depth in chapter 3.

9 Yield depletion is a phenomenon that cannot be easily controlled. When the most readily available reserves are depleted, mining and energy firms begin to explore and tap sites that are more difficult to access if global demand is strong enough to induce less efficient supply into production.

10 This issue has been identified by the Australian Government Productivity Commission. For example, see Dean Parham, *Australia's productivity growth slump: Signs of crisis, adjustment or both?*, visiting researcher paper, April 2012.



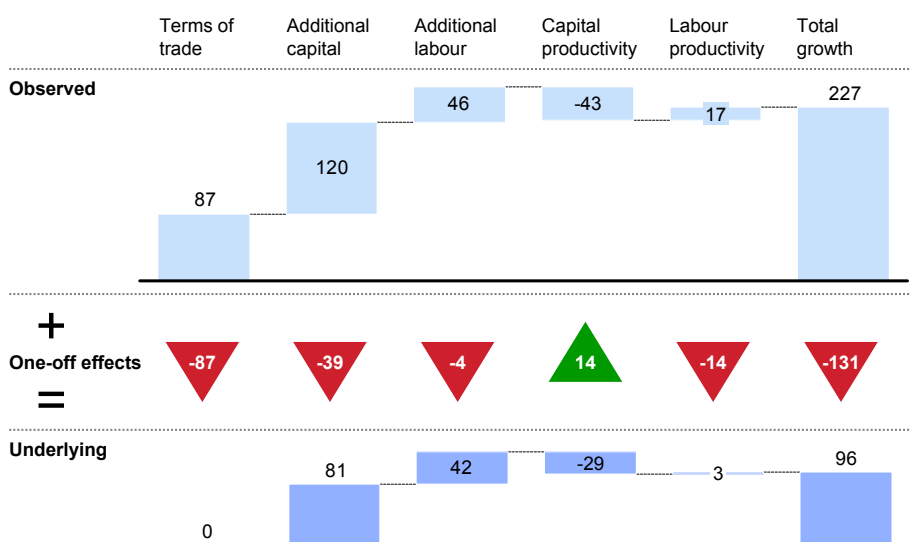
- **Labour productivity.** Labour productivity improvements added A\$17 billion to income over the past six years. Although this is a positive contribution, it is weak when compared with the A\$57 billion it generated in 1993–99 and the A\$43 billion it contributed in 1999–2005. It is especially surprising considering that each worker finished 2011 backed by 25 percent more capital than in 2005 but producing only 7 percent more output. Restoring labour productivity to its role as the primary driver of income growth is critical to ongoing prosperity.

Looking at all five factors and their trend lines, we find that more than half of income growth since 2005 has been driven by transitory effects related to the resources boom (Exhibit 7).<sup>11</sup> The fact that Australia has replaced the steady grind of ongoing productivity improvement with a far more ephemeral formula raises questions about the economy's underlying resilience.

### Exhibit 7

#### Temporary effects have driven more than half of income growth

Income growth 2005–11, market sectors  
A\$ billion, real 2010



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

□ □ □

The factors currently driving Australia's income growth are increasingly temporary in nature and unlikely to be sustained at the same strength in the future. The terms of trade and the capital inflows closely related to them are largely outside Australia's control, while the driver of growth that *can* be influenced—productivity—has been lacklustre. In the next chapter, we examine a range of possible outcomes for these drivers and combine them to construct potential scenarios for Australia's economic future.

<sup>11</sup> We arrive at this figure by separating income growth drivers into underlying and one-off factors. For detail on our methodology, see the appendix, section B, "Calculating underlying performance".

## 2. Australia's future income growth: Hard fall or soft landing?

There is no guarantee that Australia's recent pace of income growth will continue. Indeed, our analysis finds that slower growth is likely unavoidable. The key questions that will determine the severity of a potential slowdown are how long the resources boom is likely to last and whether the nation can reverse recent declines in productivity.

In this chapter, we will discuss likely high and low outcomes for both of these factors and combine them into four "what-if" scenarios to estimate a range of potential impacts on growth in Australia's gross domestic income (GDI). Our findings indicate that as the effects of the resources boom moderate, Australia can create a much softer landing by boosting productivity.

### AUSTRALIA'S FUTURE HINGES ON TWO MAJOR UNCERTAINTIES

Australia's growth prospects depend on four of the five key drivers discussed in chapter 1: two related to the resources boom (terms of trade and capital investment) and two related to productivity (capital productivity and labour productivity). The fifth driver, growth in labour, has stayed within a relatively narrow band in comparison with the other more variable drivers and therefore does not have such a large effect on shaping our scenarios.

We can consolidate our perspective on the future around two critical questions:

- **How long will the boom last?** Terms of trade and capital investment are inextricably linked to the duration of booming demand conditions. MGI's analysis of the investment pipeline tracked by the Bureau of Resources and Energy Economics (BREE) suggests that even in the low case, Australia will still experience continued record investment in the short term.<sup>12</sup> In fact, Australia is less than halfway through the investment boom: A\$166 billion has been added so far, and at least A\$252 billion more is yet to come. These numbers are even more striking given the fact that they include only projects currently identified by BREE. But a huge variation exists between the low case and the high case, which sees capital investment boosted by an additional A\$191 billion (Exhibit 8)—and the difference has a major impact on future income growth. Investors' decisions on whether to deploy that additional A\$191 billion will be determined by the terms of trade (a sharp decline in resource prices would render some capital projects still in the planning stages unprofitable, leading to delays or cancellations) as well as the cost competitiveness of Australian projects compared with alternative investments overseas. Moreover, lower terms of trade reduce cash flow and therefore the

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<sup>12</sup> *Mining industry major projects*, Australian Government Bureau of Resources and Energy Economics, April 2012. Projects in the pipeline are characterised as either advanced or less advanced. Oil and gas projects are the major focus of investment for advanced projects, accounting for 69 percent of total project value, while iron ore is 10 percent, infrastructure 9 percent, coal 7 percent, and other commodities 5 percent.

capacity and confidence needed for some of these major investments to take place.<sup>13</sup>

Compounding this investment swing, the terms of trade in and of themselves have a substantial effect on income. Australia experienced a gain to the upside of A\$87 billion in income from this effect from 2005 to 2011.

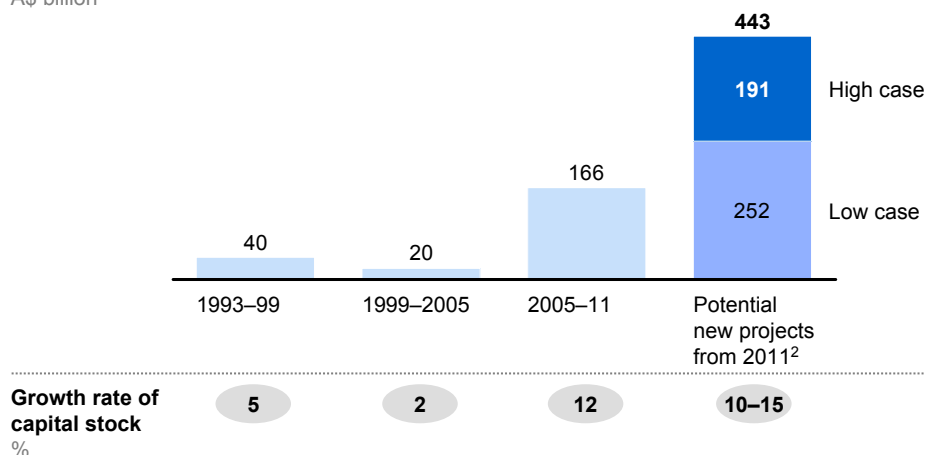
Future movements in the terms of trade are very difficult to predict. However, we can posit reasonable “bookends” to illustrate the range of possible outcomes. The upper threshold involves sustained high prices through 2017, resulting in flat terms of trade. This would require not only continued strong demand but also continued slow and inadequate supply response despite prices being well above the level required to induce investment. The lower threshold is for the terms of trade to revert toward their long-term average, declining by 11 percent by 2017 (the same rate by which they increased from 2004 to 2010). While demand is likely to continue to grow, this case assumes a faster supply response that results in normalisation of prices (as a point of reference, the Australian Treasury forecasts a decline in the terms of trade of 5.75 percent in 2012–13 and 3.25 percent in 2013–14).<sup>14</sup>

## Exhibit 8

### The scale of future capital projects is high, but uncertain

Total value of new capital stock in resources sector<sup>1</sup>

A\$ billion



<sup>1</sup> Represents growth in the capital stock in the resources sector, net of depreciation.

<sup>2</sup> High case assumes all “advanced” projects and 75 percent of less advanced projects are completed. Low case assumes 66 percent of advanced projects and 33 percent of less advanced projects are completed. No specific time frame is provided for completion of projects in the Bureau of Resources and Energy Economics list.

SOURCE: Bureau of Resources and Energy Economics list, April 2012; Australian Bureau of Statistics; McKinsey Global Institute analysis

- **How will Australia respond to the productivity challenge?** While capital lags and other one-off effects will work through the system over time, the big question remains whether or not Australia can get back on track with productivity. In the high case, we assume that labour productivity grows at 2.1 percent annually (the rate at which it grew from 1993 to 2005) and capital productivity for new projects is 24 percent (defined as value added by capital divided by capital investment), which is still well below the 39 percent

<sup>13</sup> Fortunately, the forecast price levels used in resources business cases are typically based on long-run numbers that are below the highs of 2011, so the effect of short-term price volatility is somewhat muted.

<sup>14</sup> Budget paper No. 1: Budget strategy and outlook 2012–13, Australian government, May 2012.

productivity achieved during 1993–99 because of yield decline. In the low case, we assume 0.3 percent annual growth in labour productivity (the rate from 2005 to 2011) and capital productivity for new projects is 16 percent (the current level of capital return). Australia's ability to boost productivity will directly affect its future income: The analysis shows that restoring both labour and capital productivity to their historic long-run performance trajectory under a high terms of trade scenario could result in A\$90 billion in additional income per year by 2017.

#### FOUR SCENARIOS FOR AUSTRALIA'S FUTURE INCOME GROWTH ILLUSTRATE A RANGE OF POTENTIAL OUTCOMES

Combining the high and low cases for the outcome of the resources boom and the high and low cases for Australia's productivity responses into all the possible combinations yields four potential scenarios for income growth to 2017 (Exhibit 9).<sup>15</sup> There are infinite possibilities, of course, but these scenarios are useful "what-ifs".

- **"Hangover"** (low case for terms of trade plus low case for productivity). In this scenario, which combines the low cases for both factors, Australia's income would grow at an annual rate of 0.5 percent between 2011 and 2017. Headwinds from reduced terms of trade would put the brakes on Australia's notable gains in prosperity. Though investment would remain at historic levels, at least in the short term, that would not be enough in and of itself to sustain robust income growth, and many projects currently under consideration would not break ground. Note that in this scenario, Australia's GDP growth—which does not reflect changes in the terms of trade—would remain positive.
- **"Lucky escape"** (high case for terms of trade plus low case for productivity). Income would grow at an annual rate of 2.4 percent, about half its recent performance, as firms would have incentive to continue investing heavily in the resources sector. But without improved productivity growth, income growth would largely depend on continuing high prices for Australian commodity exports.
- **"Earned rewards"** (low case for terms of trade plus high case for productivity). In this scenario, we posit a downturn in the terms of trade that would significantly slow Australia's income growth to only 1.8 percent. However, improved productivity growth helps to mitigate this negative shock.
- **"Paradise"** (high case for terms of trade plus high case for productivity). If Australia's terms of trade are maintained and productivity rises, income could grow at a healthy clip of 3.7 percent annually. While this is slower than in the boom years, it represents fundamentally sustainable growth based on better use of capital and labour to generate output. This scenario would create an economy that is more resilient in the face of a global downturn or volatility in commodity prices.

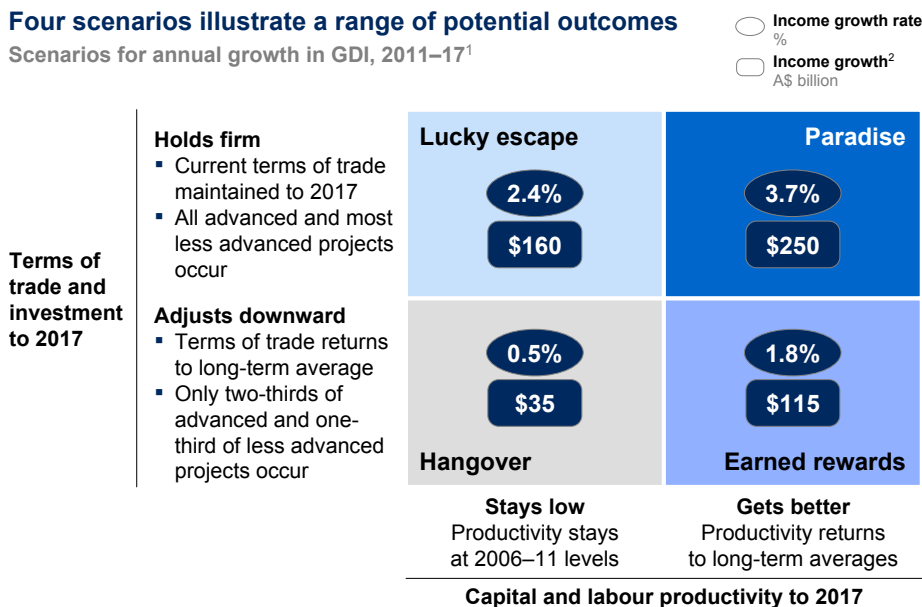
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15 Further details on the specific assumptions used in the scenario analysis can be found in the appendix, section E, "Assumptions underpinning the scenario analysis".

## Exhibit 9

### Four scenarios illustrate a range of potential outcomes

Scenarios for annual growth in GDI, 2011–17<sup>1</sup>



<sup>1</sup> Adjusted for lagged returns from capital recently added.

<sup>2</sup> Difference in income between 2011 and 2017, rounded to the nearest A\$5 billion.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

There are two notes regarding methodology to keep in mind when interpreting the results. First, these are scenarios and not forecasts. We characterise the high and low cases for each factor that goes into the scenario as “bookends”. We have attempted to outline a range of feasible outcomes for critical aspects of Australia’s future growth looking toward 2017, but we do not represent these as model-driven forecasts.<sup>16</sup> Second, the results incorporate only the primary impacts of the factors considered and do not include any dynamic equilibrium adjustment for additional economic effects that may result from the scenarios themselves. For example, we do not attempt to calculate the effect of a potential global reduction in ore supply as a result of lower prices, which could cushion a fall in Australia’s terms of trade.

## THIS UNCERTAINTY BRINGS THE PRODUCTIVITY IMPERATIVE INTO SHARP FOCUS

This scenario analysis produces three major implications for Australia:

- **Income growth is likely to moderate.** Australia does not achieve its recent levels of income growth in any scenario. To match recent income growth would require further improvement in the terms of trade, an outcome that cannot be assumed. Our best-case assumption is that commodity prices stay at current high levels, with any greater demand offset by new supply coming online. If, however, the terms of trade deteriorate, Australia’s income growth would slow significantly. Improved productivity growth offers a way to mitigate this potential negative shock, as shown in the “earned rewards” scenario.
- **The duration of the boom is of crucial short-term importance.** The continuation of the boom, with its attendant high investment and high terms

<sup>16</sup> In terms of probability, it could be argued that lower terms of trade would induce higher productivity benefits (as low-yielding projects may be cancelled), and vice versa, so the “hangover” and “paradise” scenarios may be less likely than the other two scenarios.

of trade, makes a bigger difference to income growth than does productivity between now and 2017. The difference between the high and low cases for terms of trade and investment is a 1.9 percent swing in annual income growth, or up to A\$135 billion of income per year at risk by 2017. Restoring productivity growth to its longer-term average makes a 1.3 percent difference, delivering up to A\$90 billion in 2017 income.

- **But productivity is critical for longer-term prosperity.** Because the intensity and duration of the resources boom cannot be controlled, boosting productivity is Australia's central challenge. Improving productivity growth is by no means easy, but this change could be set in motion by any number of forces, including international competition in sectors that are able to respond, a return to normal terms of trade that shifts capital and labour to more productive sectors, or a renewed focus by firms and government on innovation and improvement.

□ □ □

The degree to which Australia can boost productivity will have a major impact on future income growth. Capturing the full growth potential will require a forensic understanding of the dynamics and challenges in different sectors of the economy. In the next chapter, we take a sector-by-sector look at the issues affecting productivity performance.

### 3. The productivity challenge of a four-part economy

Australians often speak of their “two-speed” economy, made up of a rapidly growing resources sector and everything else, which is expanding more slowly. Much debate tends to focus on how other sectors can benefit from the resources boom or whether they have been crowded out by it.

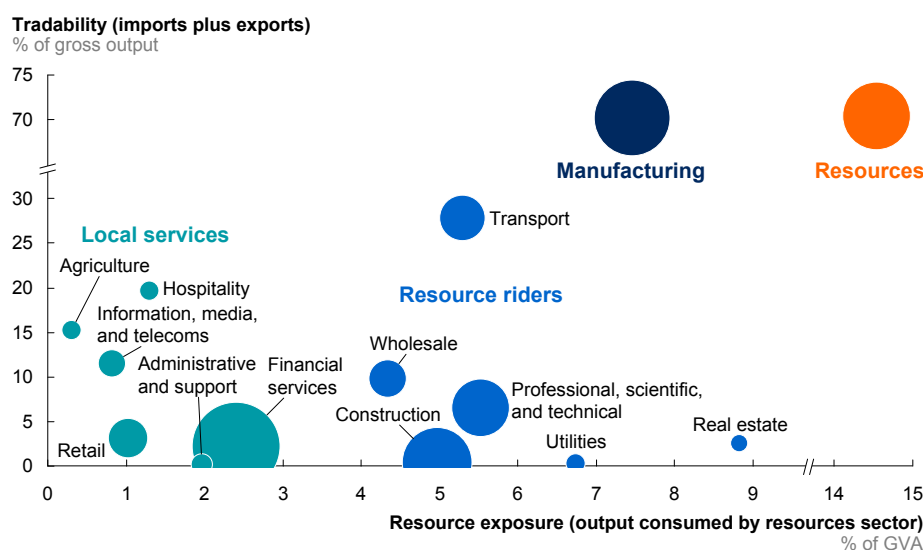
However, we find this a somewhat oversimplified view of the Australian economy. If we examine sectors on the basis of their exposure to a surge in mining activity and high exchange rates—the two major factors of the boom—we find that Australia has a four-part economy. The first variable used to define the four clusters of sectors was their “resource exposure”—the proportion of output consumed by the resources sector.<sup>17</sup> The real estate sector, for example, has the highest exposure, with almost 9 percent of its income coming directly from the resources sector. The second variable was “tradability”—a sector’s imports and exports combined as a share of its total gross value added. A higher share indicates that the sector is more sensitive to changes in Australia’s exchange rates and terms of trade.

We have called the four sector clusters that result from this approach “resources”, “resource riders”, “local services”, and “manufacturing” (Exhibit 10). This chapter aims to understand the specific productivity challenges faced in each of these clusters.

#### Exhibit 10

##### Sectors group into four clusters based on their links with resources

○ Size of bubble reflects sector Gross Value Added in 2011



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

17 This is an imperfect proxy because it ignores other transmission channels between resources and other sectors (e.g., higher wages from mining resulting in greater demand for consumables), but it is the best readily available measure of the strength of these linkages.

The drivers of growth vary widely by group (Exhibit 11). Resources, resource riders, and local services all achieved output growth of 3.4 to 3.5 percent but in very different ways. Resources and resource riders absorbed huge inflows of inputs but delivered poor productivity performances. Moderate amounts of new inputs went into local services, but this group delivered much better on productivity than the other clusters. Manufacturing, meanwhile, suffered a contraction in labour as well as poor productivity to post annual output growth of just 0.4 percent over the boom era.

### Exhibit 11

#### The four clusters have varied in their economic performance over the past six years

2005–11

Contribution to GVA growth
A\$ billion
Compound annual growth rate
%

	Additional capital	Additional labour	Capital productivity	Labour productivity	Total
<b>Resources</b>	\$55	\$10	-\$41	-\$6	\$18
	11.7%	10.5%	-7.3%	-6.3%	3.5%
<b>Resource riders</b>	\$32	\$31	\$4	\$0	\$67
	5.3%	3.0%	0.0%	-0.6%	3.4%
<b>Local services</b>	\$18	\$6	\$13	\$12	\$49
	3.3%	1.1%	2.1%	1.0%	3.4%
<b>Manufacturing</b>	\$10	-\$4	-\$13	\$9	\$2
	3.7%	-1.3%	-4.8%	2.8%	0.4%
<b>Market<sup>1</sup></b>	\$119	\$46	-\$43	\$17	\$140
	5.4%	1.5%	-1.5%	0.3%	2.7%

1 Market total includes two small sectors—arts and recreation and “other”—that are not part of the clusters.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

This chapter examines each of the four sector clusters in turn, highlighting their unique productivity challenges.



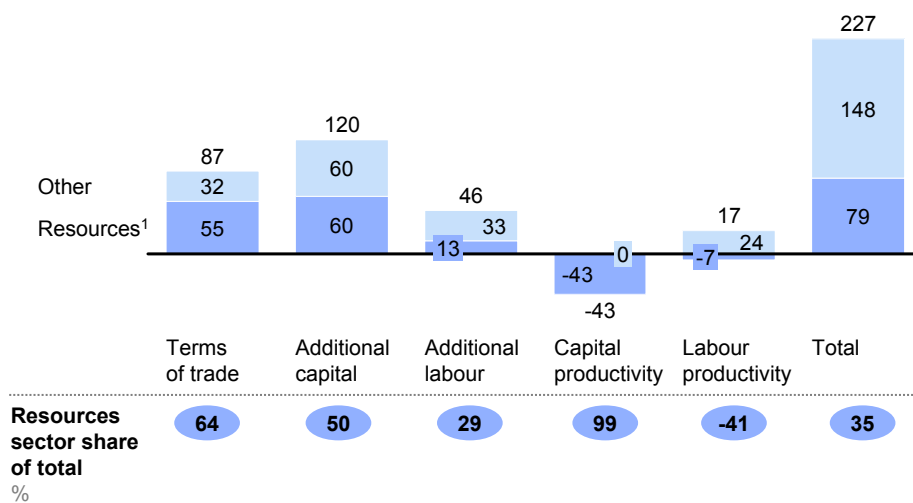
## RESOURCES: CAPITAL PRODUCTIVITY IS THE KEY CHALLENGE

The resources sector accounts for 10 percent of Australia's economic output and just 3 percent of its labour but has generated 35 percent of Australia's income growth since 2005. This sector has captured 64 percent of the improvement in the terms of trade and half of the increase in capital investment (Exhibit 12). The resources boom has also created huge regional disparities in economic performance (see Box 2, "Uneven growth, unevenly shared").

### Exhibit 12

#### The resources sector has been a large driver of recent income growth

Growth in GDI 2005–11, market sectors  
A\$ billion, real 2010



1 Represents extractive industries including mining, and oil and gas.

NOTE: Numbers may not sum due to rounding.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

### Box 2. Uneven growth, unevenly shared

One implication of the predominant role played by the resources industry in Australia's growth has been the uneven distribution of economic activity across states. Whether viewed in terms of hours worked, capital invested, or final demand, Western Australia and Queensland have grown more quickly than their eastern seaboard counterparts.

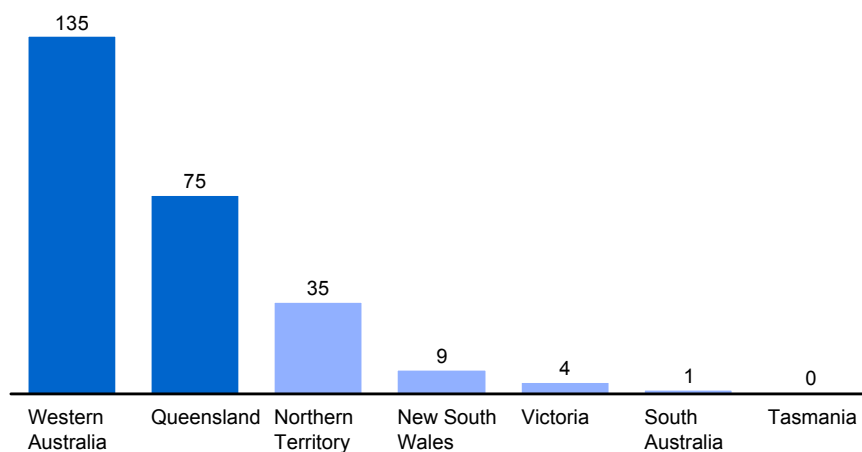
Private capital investment in Western Australia grew at a remarkable 12.1 percent annually between 2005 and 2011, compared with just 2.4 percent in Victoria and 1.4 percent in New South Wales. Growth in labour was also higher in resource-rich states, though the differences were less marked: 2.8 percent in Western Australia and 2.3 percent in Queensland compared with 2.2 percent in Victoria and 1.4 percent in New South Wales.

This booming growth is also reflected in demand: Western Australia represented 11 percent of total final demand in 2005 but accounted for 25 percent of its growth to 2011. This is largely driven by the large share of advanced projects based in the state (Exhibit 13).

#### Exhibit 13

##### 81 percent of advanced projects are in Western Australia and Queensland

Total value of advanced projects in resources by state  
A\$ billion



SOURCE: Bureau of Resources and Energy Economics list, April 2012; McKinsey Global Institute analysis

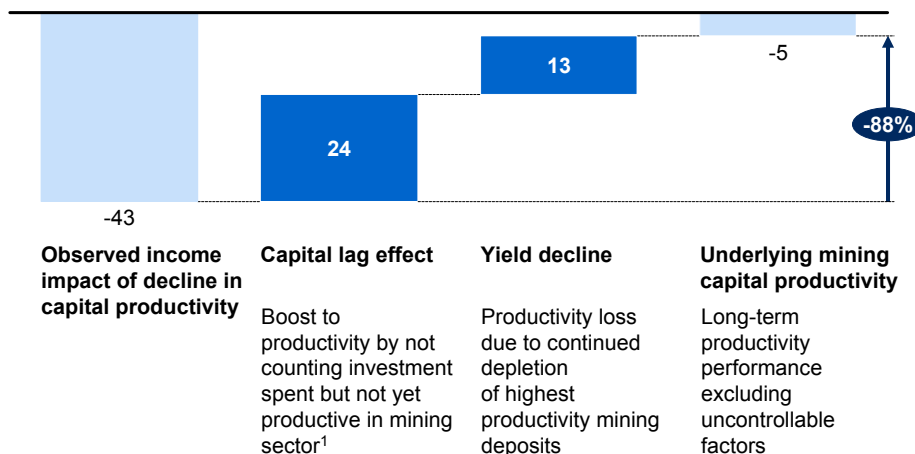
However, while favourable terms of trade have provided strong momentum, they have also obscured a brewing problem: the sector accounts for around 99 percent of the national decline in capital productivity. This means that while resources have added significantly to Australia's income since 2005, the number could have been much higher. More than 70 percent of the higher income generated by increased capital and labour has been swallowed up by lower productivity. Because the resources sector has become such an outsized driver of Australia's economy, shoring up its flagging capital productivity is crucial to achieving sustained national income growth.

When we look at the range of factors that may contribute to this fall in capital productivity, we find that the decline is not as large as the headline figure suggests. Most of it can be attributed to capital lag effects (with the benefits of some investment still to be realised in the future) and declining yields (which have a serious impact, but cannot be easily controlled). Setting aside these factors, we estimate that the resources sector has still experienced a A\$5 billion decline in income as a result of lower capital productivity (Exhibit 14). While this is substantially lower than the headline figure of A\$43 billion, it points to a real underlying issue—particularly when compared with past performance.

#### Exhibit 14

##### Capital lag and declining yields explain most of the decline in mining capital productivity

Income growth contribution, 2005–11  
A\$ billion, real 2010 dollars



<sup>1</sup> Includes non-dwelling construction in mining lagged by five years and machinery and equipment lagged by three years.

NOTE: Numbers may not sum due to rounding.

SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

Between 1999 and 2005, Australia added A\$3 billion in new capital stock each year on average. In 2011, that number had rocketed to A\$40 billion. But even that surge in investment could be dwarfed by what is set to come. As shown in Exhibit 8, planned investment in the resources sector totals A\$443 billion.

Since Australia now relies heavily on investment as a driver of growth, ensuring that this new capital is maximised efficiently will be critical for long-term income generation. In fact, improving capital productivity in Australia is important to ensuring that these projects are launched at all. There is a difference of A\$191 billion between the low and high cases of planned investment (as shown in Exhibit 8). Higher capital productivity can improve the economics, and thus the

competitiveness, of Australian resource projects. This is particularly important if global demand growth slows. The investment pipeline has been amassed during an era of low interest rates and global liquidity. But in the long term, access to capital may prove more challenging. Past MGI research has found that while a three-decade decline in global investment helped drive real interest rates down to their pre-crisis lows, an impending worldwide investment boom may drive rates higher over the next two decades.<sup>18</sup>

The potential for tighter financing terms in the future underscores the need to make sure that all investment that is currently committed is as productive as possible. Major capital projects in the resources sector are exceptionally complex undertakings, prone to cost overruns and delays caused by inadequate value optimisation, inefficient regulatory approval processes, agency failures (contractual arrangements and incentive schemes that fail to sufficiently align the interests of owners with those of advisers), and a shortage of talent. When commodity prices are high, an operational project may yield such lucrative returns on investment that there is solid business justification for rushing to completion. But without historically high prices, the focus must turn back to maximising the efficiency of operations for the long haul.

The huge size of the current project pipeline means that improving capital productivity in the resources sector could offer large rewards. Based on 23 recent projects completed by McKinsey in Australia and overseas, we estimate that opportunities exist in the resources sector to boost capital productivity by around 30 percent by addressing these barriers (see Box 3, “Improving capital productivity in major projects”). Widespread adoption of proven best practice techniques in the resources sector could free up between A\$50 billion and A\$133 billion for potential reinvestment in additional projects within Australia. This additional capital stock, at historical rates of capital productivity in the resources sector, would generate between A\$8 billion and A\$34 billion for the Australian economy each year, which translates to 0.6 to 2.3 percent of additional GDP.

Realising this potential will require resource firms to rethink their approach to capital management, focusing on value improvement at every project stage. There is also a clear role for government in influencing the time and cost of major resource projects. This includes ensuring that environmental approvals, infrastructure development, and industrial relations deliver the right balance between development and other social good, and that regulators provide maximum clarity, certainty, and speed to companies while fulfilling their mandates.

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<sup>18</sup> *Farewell to cheap capital? The implications of long-term shifts in global investment and saving*, McKinsey Global Institute, December 2010 ([www.mckinsey.com/mgi](http://www.mckinsey.com/mgi)).

### Box 3. Improving capital productivity in major projects

Past McKinsey work has identified three critical underlying drivers of capital productivity:

- **Top-level focus on value:** The global champions in capital productivity display a continuous improvement mindset that focuses on capturing all value-creation opportunities during the life of a project. Those mindsets are often reinforced by the introduction of top-down targets on final production cost to balance the engineering objectives against cost considerations, and strong performance management to ensure minimum leakage and deviation from these plans.
- **Adoption of a best-practice “tool kit”:** High-performing companies generally employ a well-structured optimisation tool kit. Far from being a mere checklist, the tool kit is more of a “how-to guide” to extracting value from an asset. It provides the process for reviewing an investment end-to-end as well as the analytical tools to identify value opportunities. Key tools include: (a) concept and design optimisation, using techniques like system balance, design-to-cost, and minimum technical solutions; (b) flawless construction and approvals involving idea-generation processes, tight performance management, and visual management; (c) ramp-up acceleration deploying preventive problem-solving techniques before issues arise; (d) procurement optimisation that draws on lowest-cost-country sourcing, clean sheet costing,

and best-of-best benchmarking; and (e) a contracting strategy that defines the role of the owner's team for optimal risk allocation and establishes the contractual foundations to drive continuous improvement.

- **Project team with superior execution skills:** All companies aspire to have the best talent on their projects. Unfortunately, Australian firms are finding that talent with experience in major projects is in short supply. High-performing companies have focused on investing in internal capability development, as well as on partnering with companies with complementary needs to address internal capability gaps while maintaining aligned incentives with the asset owner.

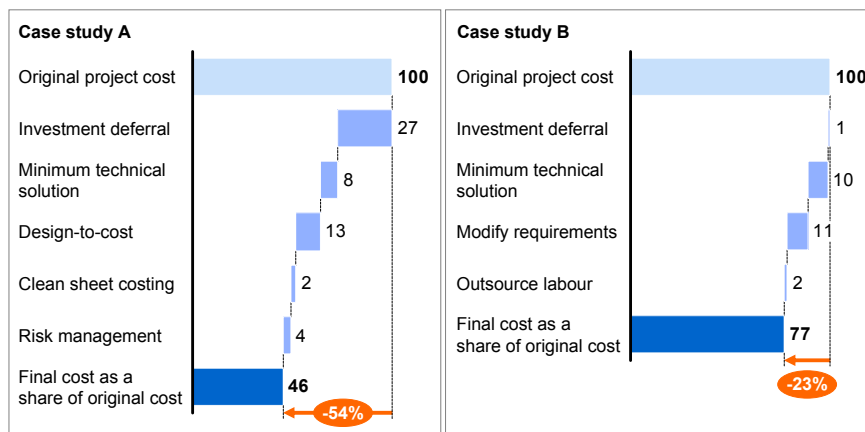
Employing these techniques can lead to significant savings. In one example, optimisation techniques allowed a project team to reduce the original estimated cost of a large-scale infrastructure build-out by more than 50 percent (Exhibit 15). In another case study, the cost of a complex resources project was reduced by more than 20 percent thanks to a rigorous focus on value creation on the part of the senior management team that led to re-scoping the original project design (Exhibit 15). A third example saw the productivity of the construction crew for a major resources project double through the adoption of lean construction techniques, thereby reducing costs and accelerating the project's time to completion.

**Exhibit 15**

**Case studies have demonstrated the potential to generate savings of more than 20 percent from the use of best-practice capital productivity tools**

SELECTED  
EXAMPLES

Project capital savings by lever  
Index: 100 = Original project cost



SOURCE: McKinsey Global Institute analysis

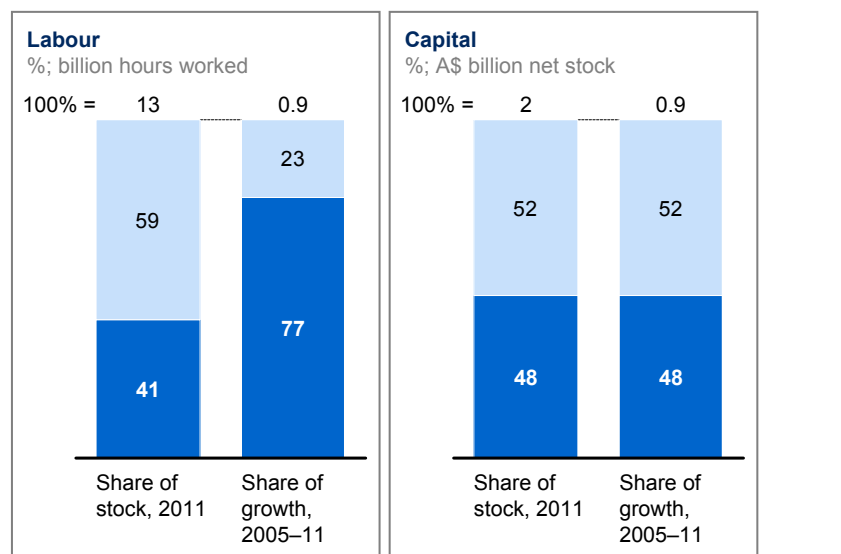
## RESOURCE RIDERS: UTILITIES, IN PARTICULAR, NEED TO REFOCUS ON PRODUCTIVITY

Resource riders include transport, construction (conducted outside resource firms but often for the benefit of the resources sector), professional and technical services, real estate, wholesale goods, and utilities. This varied group shares high exposure to the resources sector and moderate to low import competition. This cluster has built on strong momentum from the mining and energy boom, but its rapid growth has been accompanied by a worrisome decline in productivity. The performance of individual sectors has been mixed. However, looking at the group as a whole, combined income growth from productivity of labour and capital declined from A\$25 billion added from 1993 to 1999 to only A\$4 billion added from 2005 to 2011.

The major culprit has been labour productivity. These sectors have attracted the vast majority of the overall economy's increase in labour, increasing their combined total hours worked by 919 million (or 19 percent) from 2005 to 2011 (Exhibit 16). However, the contribution of labour productivity to sector output has fallen to virtually zero during this period.

### Exhibit 16

#### Resource riders have absorbed a large share of growth in inputs



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

This fall in labour productivity is particularly notable because it occurred in spite of large capital investment. These sectors have invested heavily to take advantage of the resources boom, increasing their net capital stock by 37 percent between 2005 and 2011—double the rate observed in our next cluster, local services. However, the impact of this increased investment has not yet led to higher labour productivity.

Within the resource riders group, the utilities sector (including energy and water) stands out for its sluggish productivity performance. Recent analysis by the Australian Productivity Commission has found that multifactor productivity growth in the utilities sector was strongly negative between 1997–98 and 2009–10 (falling, on average, by 3.2 percent per year).<sup>19</sup> But the analysis shows that the story is more complex. One factor driving down performance is the effect of cyclical investment; the cost base has been increased by expenditures that have yet to yield their benefits. Utilities have also invested in unrecorded quality improvements (such as the shift to underground cabling) and reducing their environmental impact by moving away from coal power. For electricity suppliers, the largest subsector, customers' need to beat the heat has been a vexing issue: spikes in power usage during midday hours, when consumers turn on their air conditioners en masse, have dramatically increased the ratio between peak use and average use, driving up costs for capacity that sits idle at cooler times of the day.

When new capital investment in mining and energy projects eventually slows, the resource riders will once again have to look to productivity gains as a source of future growth. Among the priorities, finding new ways to make infrastructure development more cost-efficient and adopting a more integrated cross-sector approach to resource productivity that can reduce the need for some expensive new infrastructure (for example, addressing food waste to save water and energy) will be crucial.

### **LOCAL SERVICES: MATCHING INTERNATIONAL PRODUCTIVITY BENCHMARKS WILL REQUIRE FURTHER MICROECONOMIC REFORM**

The local services group, which includes sectors such as retail trade and telecommunications, has neither high exposure to resources nor significant import competition. It accounts for a major share of the Australian economy: 42 percent of hours worked, 40 percent of value added, and 25 percent of capital stock. This cluster has not benefited as much from the boom as the resource riders category, but neither has it faced the full impact of higher exchange rates and low-cost import competition that have affected manufacturing.

The productivity of these sectors has been reasonably healthy, with solid gains that predate the resources boom. Capital productivity has been growing at 2.1 percent per year while labour productivity has been growing at 1.0 percent per year, making an A\$25 billion contribution to income growth from 2005 to 2011. Indeed, this is the only cluster that has improved both capital and labour productivity.

Nevertheless, sectors within this group lag behind international best practice, and a comparison with their US counterparts reveals an average gap of A\$32 per hour in labour productivity (Exhibit 17).<sup>20</sup> Past MGI research shows that changes

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19 *Productivity in electricity, gas and water: Measurement and implementation*, Australian Government Productivity Commission staff working paper, April 2012.

20 There are methodological issues with cross-country sector productivity comparisons, and MGI has traditionally preferred to use operational-level metrics (e.g., number of cars produced per worker when estimating automotive productivity). However, in the absence of operational-level metrics, these estimates can be used as rough indicators of relative productivity levels. The results were found to be broadly consistent when compared to estimates derived from EU KLEMS data ([www.euklems.net](http://www.euklems.net)), which uses sector-level price data to convert sector value-added measures into common currencies.

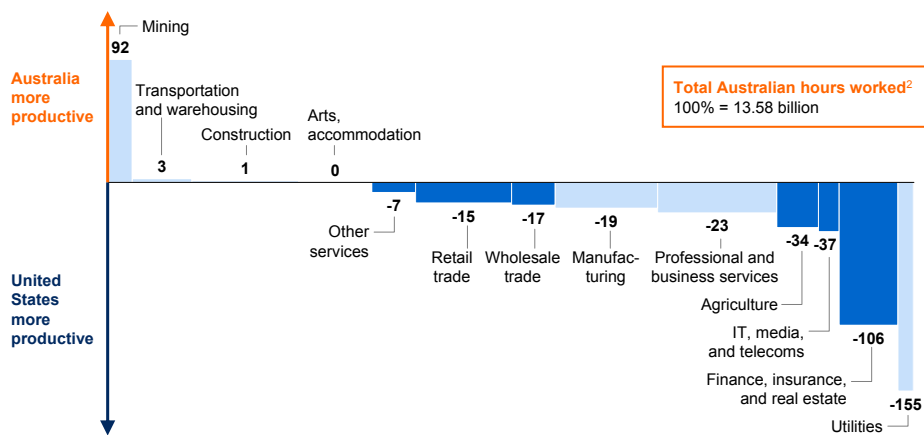
in operating models within individual companies and sectors (e.g., supply-chain automation) can have significant productivity benefits. In addition, a concerted effort by policy makers to streamline regulation, encourage innovation, and promote competitive markets can boost productivity. To close the gaps between these sectors and their international counterparts, Australia needs to re-embrace the cause of microeconomic reform, which drove so much of its growth in the 1990s.

### Exhibit 17

#### Local services have room to improve their productivity compared with the United States

Average labour productivity, 2005–10<sup>1</sup>

A\$ per hour, real 2010



<sup>1</sup> Attributes all output to labour inputs (i.e., does not include differences in capital inputs).

<sup>2</sup> Includes private sectors only, weighted by Australian hourly sector weights (2010).

<sup>3</sup> The real estate sector is considered a "resource rider" in the Australian context but cannot be separated from finance and insurance in the US source data.

SOURCE: US Bureau of Economic Analysis; Australian Bureau of Statistics; McKinsey Global Institute analysis

### MANUFACTURING: THERE IS POTENTIAL FOR REALISING GAINS IN KEY SUBSECTORS DESPITE A BROADER SECULAR DECLINE

Like other developed economies, Australia has experienced a long-term secular decline in manufacturing (Exhibit 18). Capital productivity has fallen significantly over the past six years and has been only partly offset by gains in labour productivity. Moreover, manufacturing firms have lost skilled talent to the resources and resource-rider sectors. While the erosion has accelerated over the last few years, it reflects fundamentally long-term and international trends, and cannot be attributed to the resources boom.

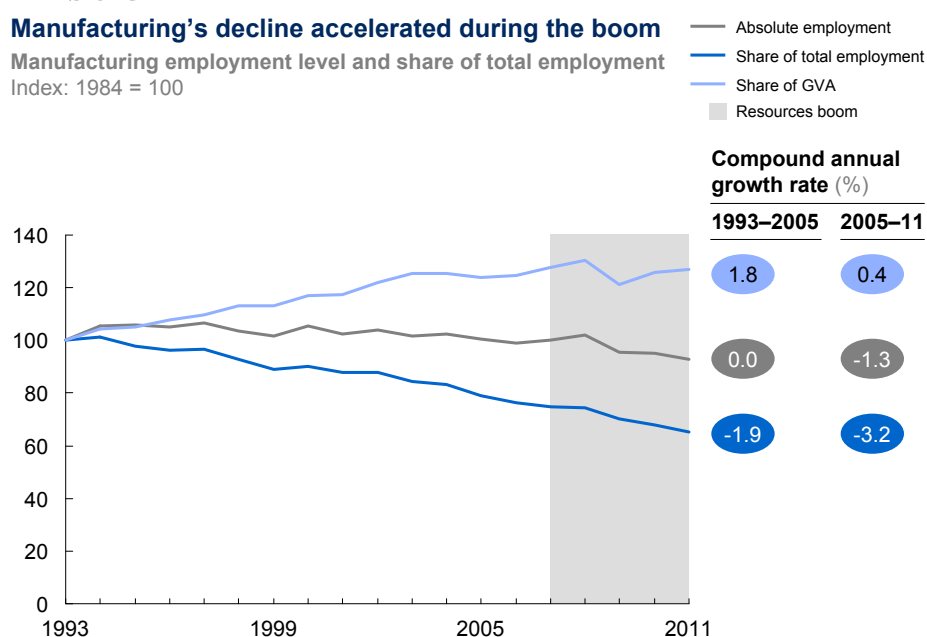


The decline in manufacturing has not been uniform across subsectors.<sup>21</sup> To improve our understanding of the factors driving productivity in this cluster, we have divided manufacturing into five categories defined by the nature of their competitiveness challenge.<sup>22</sup> These are (1) innovation-driven sectors such as aerospace and pharmaceuticals that rely on heavy technologies and have long R&D cycles; (2) strongly branded sectors including publishing that are dependent on brand image and sustained through innovation in design and concept; (3) location-based sectors such as food manufacturing that depend on proximity to customers; (4) somewhat exposed sectors such as automotive and electrical machinery that depend on quality but also face cost pressures; and (5) highly exposed sectors including apparel and consumer electronics that are largely driven by cost.

## Exhibit 18

### Manufacturing's decline accelerated during the boom

Manufacturing employment level and share of total employment  
Index: 1984 = 100



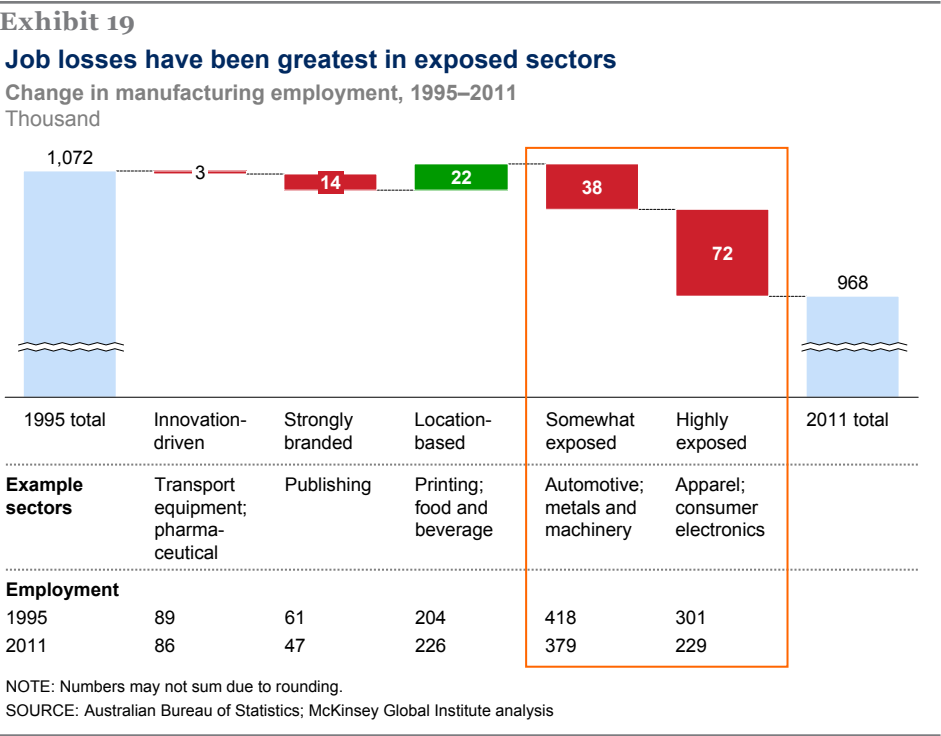
SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

Using this segmentation, we find that the subsectors that face the greatest threat from low-cost overseas producers have suffered the biggest job losses (Exhibit 19). These losses have occurred despite significant efforts to improve efficiency. Labour productivity in these sectors grew by an average of 4 percent between 1995 and 2005 (although this growth still lagged behind the productivity gains of counterpart sectors in the United States). Subsectors that are less

<sup>21</sup> Even at the subsector level, the picture is not homogeneous. The Productivity Commission noted that “there appear to be islands of competitive advantage within almost all broad manufacturing categories”: *Trends in Australian manufacturing*, Australian Government Productivity Commission, August 2003. An Australian House committee noted that “Clothing production now only accounts for less than 3 percent of manufacturing and what remains is increasingly high-end fashion or specialist wear such as fire-resistant clothing”: *Australian manufacturing: Today and tomorrow*, House of Representatives Standing Committee on Economics, Finance, and Public Administration, July 2007. The Future Manufacturing Council identified significant potential for such niches even within the textiles manufacturing subsector, including smart protective textiles for the military and emergency services and textile composites for aerospace, automotive, and marine: *Trends in manufacturing to 2020*, Future Manufacturing Industry Innovation Council, September 2011.

<sup>22</sup> This approach builds on analysis from *Reinvigorating industry in France*, McKinsey Global Institute, October 2006 ([www.mckinsey.com/mgi](http://www.mckinsey.com/mgi)).

exposed to international competition have experienced more modest job losses but have posted weaker productivity gains.



Although there is a lack of recent data on the productivity performance of Australian manufacturing subsectors, a comparison of all five manufacturing categories to various international benchmarks from 1995 to 2005, using available evidence, unearths some disturbing trends. Labour productivity growth in all five categories lagged behind that of their counterparts in the United States. The gap was particularly pronounced in innovation-driven sectors, where US productivity growth was 1.5 percentage points higher per year (4.9 percent versus 3.4 percent) during this period. To strengthen the long-term competitiveness of its manufacturing sector, Australia will need to tackle a number of issues, including encouraging further innovation in technology-driven manufacturing sectors, promoting labour mobility in the manufacturing sector, and addressing management quality concerns (see Box 4, “Management matters”).

□ □ □

Securing Australia’s future prosperity will require a renewed focus on boosting productivity, innovation, and efficiency—and each sector faces unique challenges that will have to be addressed. But successful action along these lines could deliver additional national income of up to A\$90 billion per year over and above a business-as-usual scenario by 2017.

#### Box 4. Management matters

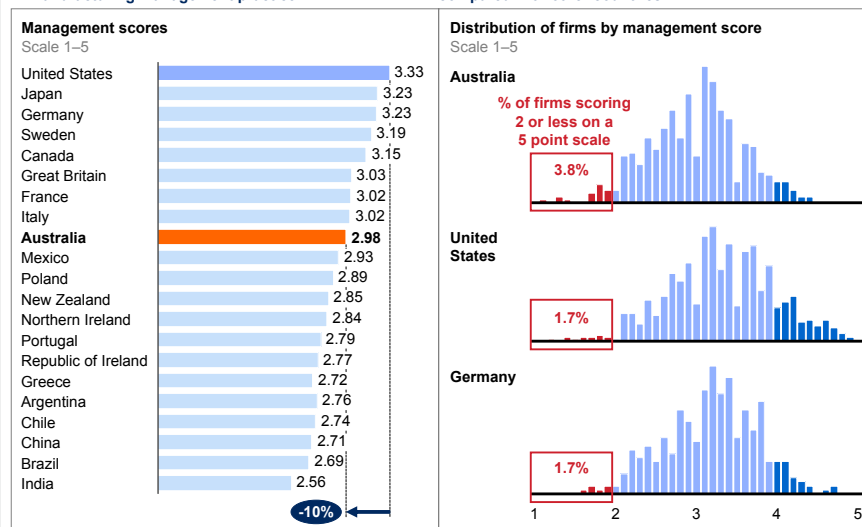
McKinsey, together with the Centre for Economic Performance at the London School of Economics, has examined the relationship between management quality and firm performance. Interviews were conducted at more than 6,000 manufacturers across 21 countries, focusing on lean operations, performance management, and talent management.<sup>1</sup> This research reveals that Australia has a larger tail of low-performing firms than other advanced economies—Australian scores were 10 percent lower than US scores on average, for instance—and a shortage of managers with university degrees (Exhibit 20). Left unaddressed, this problem is poised to grow more acute over time, since present difficulties in attracting skilled employees to manufacturing points to a shortage of future management candidates. Already, manufacturers worry that “the senior technical staff and the manufacturing managers of the future won’t be available because they have not been developing their skills and experience in the industry”.<sup>2</sup>

#### Exhibit 20

##### Management practice could be improved in some Australian manufacturers

Australia lags significantly behind the United States in manufacturing management practice ...

... with a larger share of underperforming managers compared with other countries



SOURCE: McKinsey and Company, Management Matters 2008, 2009; McKinsey Global Institute analysis

- 1 Nick Bloom et al., “Management practice & productivity: Why they matter”, *Management Matters*, November 2007.
- 2 *A more competitive manufacturing industry: Management and workforce skills and talent*, Australian Industry Group and University of Technology, Sydney, February 2012.

## Conclusion: Thinking beyond the boom

Australia has a complex relationship with the coal, ore, and minerals beneath its soil. While this wealth of natural resources has fuelled enviable income growth, it has also caused distortions across the economy—and to a certain extent, it has allowed Australia to avoid confronting its deteriorating fundamentals.

Thanks to the prosperity generated by the resources boom, Australia's productivity problem has not been acutely felt—yet. But the good luck might not last forever. Yes, economic and demographic trends in the developing world point to sustained global demand for resources in the decades ahead, but there is risk in relying heavily on a single sector (especially one marked by extreme short-term price volatility) to deliver growth.

The determinants of past income growth are not assured into the future. The continuation of the incredible growth story in China and other emerging markets can only sustain the terms of trade at current levels, not increase them further. In a worst case, growth in the developed world slows and Australia's terms of trade and investment slow with it.

Australia has a window of opportunity to insure against a potential slowdown by addressing the productivity of both capital and labour. A major focus on capital productivity is crucial to maximise the unprecedented investment that has flooded into mining and energy, ensuring that it pays dividends in the years ahead. And across the broader economy, business and government leaders can tackle key priority areas to encourage innovation and build a more competitive workforce.

We estimate that a concerted effort to shore up productivity could deliver a major prize, adding up to A\$90 billion in national income per year by 2017. Beyond that potential gain, the rewards could be even more lasting: meeting the productivity challenge could build a more balanced and resilient economy that is better prepared to meet changing conditions and market opportunities in the years ahead.

## Appendix: Methodology

- A. Measuring productivity: Splitting capital and labour
- B. Calculating underlying performance
- C. Volume versus price-based capital productivity measures
- D. Measuring Australia's income
- E. Assumptions underpinning the scenario analysis

### **A. MEASURING PRODUCTIVITY: SPLITTING CAPITAL AND LABOUR**

Productivity is the growth in outputs generated through efficiency, rather than through adding more inputs. It arises through improvements in technology as well as social capital.

Multifactor productivity, calculated and reported by the Australian Bureau of Statistics (ABS), is the most sophisticated approach to measuring this. It takes into account the fact that in a modern (nonagricultural) economy, output is the result of the two primary factors of production: labour and capital, which are combined and in many situations are substitutable. It is calculated by attributing a share of output to capital and a share to labour, and then combining the weighted productivity of each share according to the amount of capital and labour used to produce each respectively.

This report uses multifactor productivity as the basis of all its analysis. Income weights to labour and capital used in this report have been derived by the ABS using a Cobb–Douglas production function methodology.

But throughout this report, values for labour productivity and capital productivity are presented separately, as are their respective contributions to growth in output and income. This separation relies on the same income attribution produced and used by the ABS, with the distinction that rather than being combined to a single measure (multifactor productivity), they are reported as separate series.

This separation ensures that effects such as capital deepening (which would improve labour productivity) are stripped out of the results. It gives a clearer view of the underlying or intrinsic performance of productivity for each of the two fundamental factors of production.

When we talk about inputs in this report, we use volume-based measures: hours for labour and volume measures of capital. This approach excludes the fact that the real dollar cost of labour (wages) and capital (priced fixed capital formation) may diverge from volume-based measures over time. Divergences between volume-based measures and price-based measures of performance are dealt with in section C below.

The issue of declining productivity in the Australian economy has received wide comment, with the Reserve Bank of Australia, the Productivity Commission, and the Australian Treasury weighing in with analysis.<sup>23</sup>

Recently, debate has emerged on the issue of whether the decline in productivity primarily afflicts the resources sector or is more widespread across sectors. In its 2010–11 annual report, the Productivity Commission estimated that approximately 80 percent of the decline in multifactor productivity was attributable to just three sectors: mining, agriculture, and utilities. This number compares productivity growth between 1999 and 2004, and then between 2004 and 2009.

Since then, Saul Eslake calculated that removal of the mining and utilities sectors from an overall assessment of labour productivity resulted in only a 10 percent reduction in the decline in growth, hinting at a labour productivity issue that was much more widespread.<sup>24</sup>

These two assessments need not be contradictory. The labour productivity lens used by Eslake in his research indeed demonstrated a productivity issue across sectors that we discuss in this report. However, this perspective isolates labour without considering the impact of capital deepening and productivity on the multifactor result.

Multifactor productivity growth, as calculated by the Productivity Commission (drawing on ABS data) represents the growth in output attributable to both capital and labour. Our results support the importance of capital as part of the overall productivity story. Splitting output into its labour and capital components shows a greater reduction in capital performance than in labour, and a prominent role for mining in driving the reduction in capital productivity over the last six years.

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23 Ellis Connolly and David Orsmond, *The mining industry: From bust to boom*, Reserve Bank of Australia research discussion paper number 2011–08, December 2011; *Annual report 2010–11*, Australian Government Productivity Commission, October 2011; and David Gruen, “The macroeconomic and structural implications of a once-in-a-lifetime boom in the terms of trade”, speech delivered to the Australian Business Economists Annual Conference in Sydney, November 24, 2011.

24 Saul Eslake, “Productivity: The lost decade”, paper presented to the annual policy conference of the Reserve Bank of Australia in Kirribilli, August 2011.

## B. CALCULATING UNDERLYING PERFORMANCE

In Exhibit 7 and throughout this report, we distinguish between observed and underlying performance. The purpose of this distinction is to understand how much of the recent contribution to income from various factors has been based on temporary or cyclical factors. With that knowledge in hand, we can try to assess how much of that growth may continue into the future. For each of the five major components of income growth, we define temporary effects as follows:

- **Additional capital:** Capital has been added to the economy at a rate well above the long-term trend.
- **Additional labour:** A\$4 billion of the growth in income from additional labour is attributable to increases in the participation rate—a factor that cannot be repeated in the long term to provide additional labour force growth.
- **Capital productivity:** Of the observed downturn in capital productivity, A\$24 billion is attributable to the temporary effect of capital lag (the time lag between the investment of new capital and when it begins to actually produce output).
- **Labour productivity:** Of the observed income boost from labour productivity improvement, A\$6 billion was attributable to changes in the sector mix rather than intrinsic within-sector improvement.

## C. VOLUME VERSUS PRICE-BASED CAPITAL PRODUCTIVITY MEASURES

We base our analysis of productivity on volume measures of input and output: hours worked for labour, gross fixed capital formation, and net capital stock. This allows us to isolate the impact of the terms of trade. While the volume-based view is suitable for macroeconomic analysis, a price-based view that values inputs and outputs drives business investment decisions.

The difference between these two metrics is most marked in sectors such as agriculture, manufacturing, and resources that heavily export or import goods. Changes in the terms of trade may mean that realised income differs significantly from volume-based, gross value added measures. In other sectors, realised income is very close to sector value added as recorded by the ABS.

Resources experienced the largest divergence between headline productivity and income of any sector. The price-related income boost from ore and coal alone generated A\$80 billion of additional income between 2005 and 2011. Despite declining headline productivity, rising prices triggered an investment boom. However, the prices of capital inputs have also risen. In the Australian economy overall, real prices for capital goods have been relatively flat since the early 1990s, but the resources sector has had capital price inflation of about 3 percent per year since 1990. From 2005 to 2009, the rate nudged toward 5 percent, although it has since started to wane once again. In a sector where more than 70 percent of multifactor inputs are capital, these developments have significant implications for the sector's future income prospects. See chapter 3 for a more detailed discussion.

#### D. MEASURING AUSTRALIA'S INCOME

Throughout this report, we draw a distinction between “output” and “income”. Output is a measure of the actual production or consumption of the economy. GDP and gross value added (GVA) are both measures of output. These metrics are adjusted for changes in the prices of goods produced to reflect “real” changes in how much is being produced in the entire economy (in the case of GDP) or in a particular industry (in the case of GVA). Measuring output is useful because it provides us with a view of the efficiency or productivity of production, which is a key topic for this report. A company may become more profitable if the prices of what it produces rise. But if that company requires more inputs for a certain amount of production, it has still become less productive.

By comparison, income measures reflect the reality that an economy earns more income when it receives higher prices for the goods that it exports and that effective incomes are higher when goods that an economy imports become cheaper. In Australia, the ABS measures income as GDI (GDP adjusted for changes in the relative prices of imports and exports).<sup>25</sup>

There are limitations to the way income is measured. GDP and GDI are assumed to be equal for the previous year, so only one year's worth of deviation is shown in any given year. In the long run, assuming that relative import and export prices remain constant, this is not problematic. However, Australia is in the middle of a historically long deviation between income and output because of sustained higher prices for commodities, and a long-term decrease in the prices of its imports. To account for this, we assume (as the ABS does) that GDP and GDI are equal in the base year of 1993 used in this report (the beginning of the first “era” of our analysis). From this point, we have used annual growth rates of each series to show the deviation between output and income. We treat any growth in GDI that is in excess of GDP growth as purely a result of changing terms of trade.

In our review of GDI, we do not distinguish between locally and foreign-owned capital and income. These distinctions would be available in a review of GNI, but this metric includes income from Australian investment in foreign economies, which have their own productivity stories and are outside the scope of this study.

Growth in the terms of trade has meant the first significant divergence between GDI and GDP (which does not take into account changes in international purchasing power) in more than 50 years (Exhibit A1). In the past, policy makers and the media have been comfortable using GDP as the main measure of the country's prosperity. However, in an era when the terms and volume of trade have become more volatile, we believe that a sole focus on GDP may no longer be appropriate. Looking at GDP and GDI in parallel shows a gap that may be explained by productivity performance.

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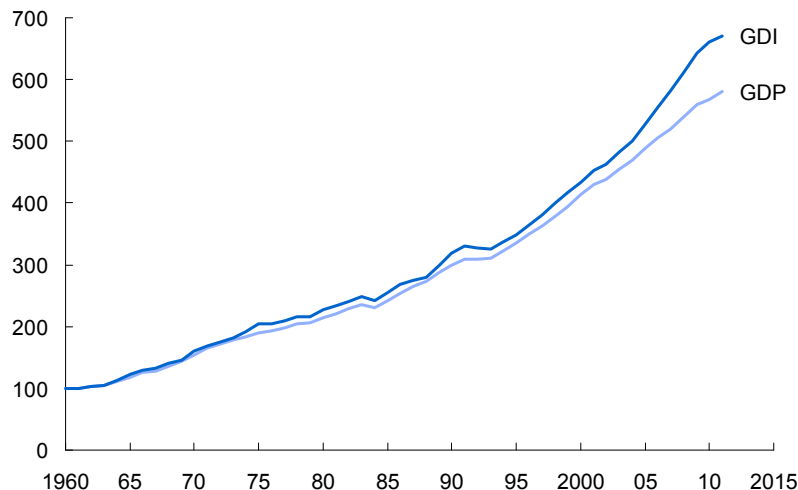
<sup>25</sup> For a detailed discussion of the methodology used to calculate income, see the ABS documentation or an excellent discussion in Robert Gregory's recent paper, *Living standards, terms of trade and foreign ownership: Reflections on the Australian mining boom*, Australian National University, Centre for Economic Policy Research discussion paper number 656, December 2011.



## Exhibit A1

### GD I and GDP have diverged in recent years

Index: 1960 = 100



SOURCE: Australian Bureau of Statistics; McKinsey Global Institute analysis

## E. ASSUMPTIONS UNDERPINNING THE SCENARIO ANALYSIS

As outlined in chapter 1, Australia's growth prospects depend on five key drivers: the terms of trade, growth in inputs (additional capital and labour), and productivity growth (capital productivity and labour productivity). Combining various bookend assumptions for these drivers, we have created four scenarios illustrating a range of outcomes for income growth as discussed in chapter 2. Below are details on the specific assumptions used for each of the five drivers:

- Terms of trade:** The terms of trade measures the difference in price levels between exports and imports. An increase in the terms of trade signifies that prices for Australian exports have risen higher than the price of imports, effectively increasing Australia's buying power on the world market (and therefore, increasing Australia's income). In the high case scenario, we assume that terms of trade remain at their current record levels until 2017, which would mean no impact on Australia's income. In the low case, we assume that terms of trade begin to revert to their long-term average. Under this scenario, we assume that the rate of decrease will match the rate of increase seen during the boom from 2004 to 2010, producing an 11 percent decrease by 2017.
- Additional capital:** Our assumptions for capital investment are based on MGI's analysis of the investment pipeline tracked by the Bureau of Resources and Energy Economics.<sup>26</sup> Under the high case scenario, we assume that 100 percent of advanced projects and three-quarters of less advanced projects will be completed by 2017, equating to A\$443 billion of capital investment. In the low case, we assume only two-thirds of advanced and one-third of less advanced projects will be completed (A\$252 billion). In both cases, we have assumed that it will take on average three years to realise income

<sup>26</sup> *Mining industry major projects*, Australian Government Bureau of Resources and Energy Economics, April 2012.

from 80 percent of mining capital invested, which reduces the immediate income derived from new capital expenditure. Future capital investment will be determined by Australia's terms of trade and the cost competitiveness of Australian projects compared with alternative investments overseas. For simplicity, we have linked the high and low cases for capital investment to the high and low cases for the terms of trade.

- **Additional labour:** The growth in labour has stayed within a relatively narrow band compared with the other, more variable, drivers and does not have such a large effect on shaping our scenarios. For simplicity, in all four scenarios we have assumed that Australia's working-age population (ages 18–65) will grow at 0.9 percent per annum, in line with ABS estimates.<sup>27</sup>
- **Capital productivity:** In the high case scenario, we assume that capital productivity for new projects (measured as value added associated with capital divided by invested capital) is 24 percent, which is still lower than the 39 percent return on capital achieved during 1993–99 because of yield decline. In the low case, we assume that capital productivity for new projects is 16 percent (the current level of capital return).
- **Labour productivity:** In the high case scenario, we assume that labour productivity grows at 2.1 percent annually (the rate at which it grew from 1993 to 2005). In the low case, we assume 0.3 percent annual growth in labour productivity (the rate from 2005 to 2011).

The impact of these assumptions on Australia's income is outlined in Exhibit A2.

## Exhibit A2

### We created four potential scenarios by adjusting key variables

Impact on Australian income<sup>1</sup>

A\$ billion

	2005–11	2011–17			
		Hangover	Earned rewards	Lucky escape	Paradise
Terms of trade	▲ 87	▼ 109	▼ 109	■ 0	■ 0
Additional capital	▲ 120	▲ 107	▲ 107	▲ 124	▲ 124
Additional labour	▲ 46	▲ 28	▲ 28	▲ 28	▲ 28
Capital productivity	▼ 43	■ 0	▲ 18	■ 0	▲ 27
Labour productivity	▲ 17	▲ 8	▲ 72	▲ 8	▲ 72
<b>Total income<sup>2</sup></b>	<b>▲ 227</b>	<b>▲ 34</b>	<b>▲ 117</b>	<b>▲ 160</b>	<b>▲ 251</b>

<sup>1</sup> Difference in income between ending year and starting year.

<sup>2</sup> In chapter 2, total income numbers are rounded to nearest A\$5 billion.

NOTE: Numbers may not sum due to rounding.

SOURCE: McKinsey Global Institute analysis

<sup>27</sup> 3222.0 Population Projections, Australia, Table C9: Population projections, by age and sex, Australian Bureau of Statistics, 2008.

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