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The Labour Market during and after the Terms of Trade Boom

Kathryn Davis, Martin McCarthy and Jonathan Bridges*

During the terms of trade boom, strong growth in output prices meant that the real cost of labour declined from the average firm's perspective and demand for labour increased. At the same time, the appreciation of the exchange rate helped contain the increase in consumption prices, so the purchasing power of employees' earnings rose and growth in the labour force picked up. Australian employment grew strongly and the unemployment rate fell.

Since 2011/12, the terms of trade have declined substantially. The mining investment boom is coming to an end and the less labour-intensive phase of resource production has begun. However, low interest rates and the depreciation of the exchange rate have supported labour demand in other sectors. Firms' output prices and unit labour costs have been little changed since the peak in the terms of trade, though there have been differences between industries. Growth in employee earnings is no longer outpacing growth in consumption prices, encouraging firms to retain or employ more workers than would otherwise have been the case. Growth in the labour force has also responded to changes in labour market conditions, and population growth has slowed. This labour market flexibility has helped to smooth the adjustment following the end of the terms of trade boom and limit the increase in the unemployment rate.

Background

Australia's terms of trade increased markedly between 2003/04 and 2011/12, as a sharp rise in commodity prices led to a dramatic increase in Australia's export prices (Graph 1). As a result, in aggregate, firms could sell their output at higher prices (Graph 2). Meanwhile, consumers did not see their living costs increase to the same extent, aided in part by lower import prices following the appreciation of the Australian dollar. This change in output and consumption prices improved the welfare of Australian households and the profits of Australian firms.[1] More recently, the terms of trade have declined and the Australian dollar has depreciated, leading to some reversal of the earlier relative price movements. Firms' output prices have been little changed in aggregate, while consumption prices have continued to increase.

These relative price movements have influenced firms' demand for labour and the attractiveness of employment to households. Firms' demand for workers is influenced by the cost of labour and the output it can produce, relative to the price at which that output can be sold. The real cost of a unit of labour is determined by the real production wage (that is, employee average hourly earnings relative

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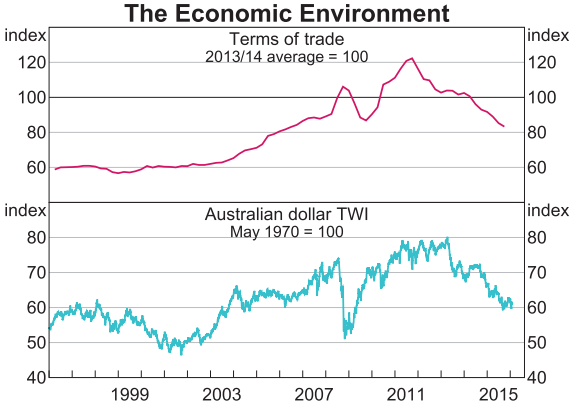
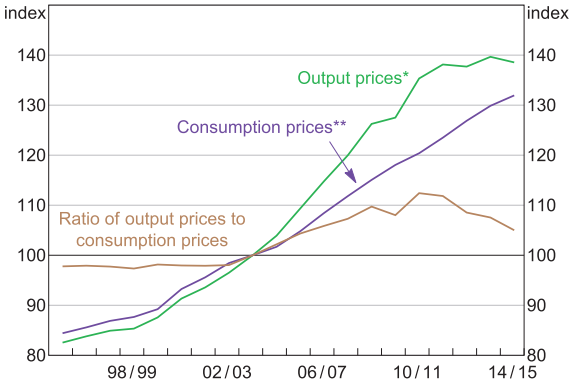
1 Most of the data used in this article are drawn from the national accounts. For consistency, consumption prices are defined by the household final consumption expenditure implicit price deflator from the national accounts, which differs somewhat from the Consumer Price Index (for detail see ABS 2011).

Graph 1
The Economic Environment



Sources: ABS; RBA

Graph 2
Output and Consumption Prices
2003/04 = 100



* Non-farm GDP deflator
** Household final consumption deflator
Sources: ABS; RBA

to output prices) as well as labour productivity (output per hour worked).[2] A decline in real unit labour costs is roughly equivalent to an increase in firms' profits as a share of income. During the terms of trade boom, average real unit labour costs declined: the cost of hiring an additional worker was relatively low compared with the expected price of the output that the worker could help to produce and, therefore, firms tended to hire more workers. Firms generally sought to expand their production capacity to take advantage of high output prices, which led to an increase in demand for productive resources such as labour and capital and, in turn, to higher growth in employee earnings.

Workers' perceptions of the benefits of working depend on the purchasing power of their earnings relative to the prices of items they consume. This is known as the real consumption wage (employee average hourly earnings relative to the household final consumption price deflator). As demand for labour increased during the boom, employee earnings growth picked up and outpaced inflation in consumption prices, which were restrained by the effect of the appreciation of the exchange rate. The increased purchasing power of employee earnings and improved job prospects was associated with more people entering the Australian labour market.

This article examines how the terms of trade boom and exchange rate movements have affected real wage growth, labour demand and supply. First, the labour market effects of the upswing in the terms of trade and exchange rate between 2003/04 and 2011/12 are discussed; further detail can be found in Plumb, Kent and Bishop (2013) and Downes, Hanslow and Tulip (2014). Second, developments during the unwinding of the boom are outlined. In each section, changes in output prices, labour costs and labour demand are first analysed from the perspective of businesses. As movements in prices and employee earnings have not been uniform across firms, three broadly defined sectors are considered: mining, non-mining tradeables and non-tradeables.[3] Lastly, the effect on households is discussed, considering the impact of relative price changes on the real consumption wage and the accompanying changes in the labour force.

2 Henceforth, employee average hourly earnings are referred to as employee earnings.

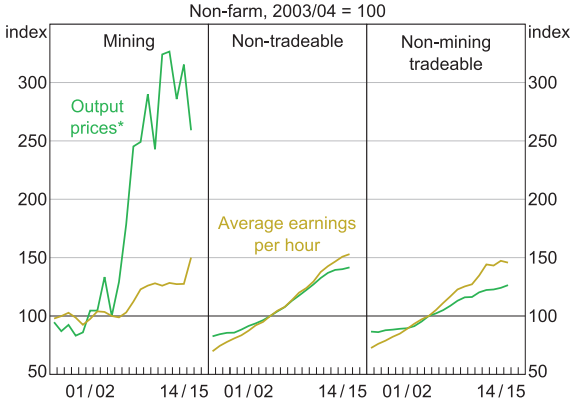
3 Following Plumb *et al* (2013) and Gorajek and Rees (2015), the economy is divided into three sectors: mining (2 per cent of employment); non-mining tradeables, where exports or competing imports are a large share of gross output: manufacturing, transport, wholesale trade, and accommodation & food services (23 per cent of employment); and non-tradeables, where exports or competing imports are relatively small share of gross output, such as the majority of household and business services (72 per cent of employment). Agriculture is not included as it was affected by weather-related developments not covered in this analysis.

During the Boom: 2003/04 to 2011/12

The effect on businesses

As has been well documented, the rise in demand for commodities that drove the increase in global commodity prices and the terms of trade boom meant that Australian mining firms' output prices rose sharply (Graph 3). To take advantage of higher demand and output prices, mining firms sought to increase their production capacity. This led to an increase in the demand for productive resources, such as labour and capital.

Graph 3
Average Earnings and Output Prices
Non-farm, 2003/04 = 100

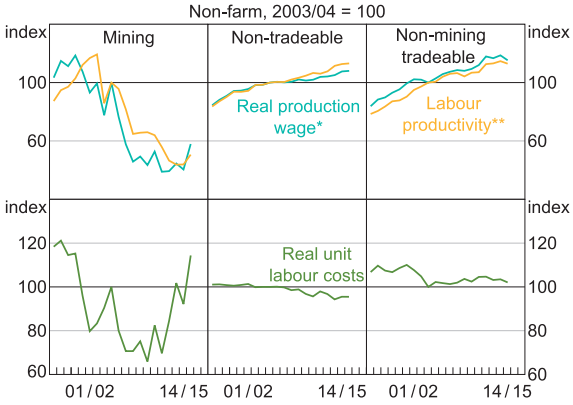


* Gross value added deflator
Sources: ABS; RBA

The mining sector offered higher wages to help attract additional workers from other sectors and from overseas, given the limited spare capacity in the Australian labour market at the time. Consequently, employee earnings rose sharply in the mining industry in the early stages of the boom. However, the increase in earnings necessary to attract the labour desired by the mining sector was much less pronounced than the increase in output prices. Therefore, the mining real production wage declined (Graph 4).

At the same time, mining labour productivity fell because additional workers were hired to expand mining capacity, but it would take some years

Graph 4
The Firm's Perspective
Non-farm, 2003/04 = 100



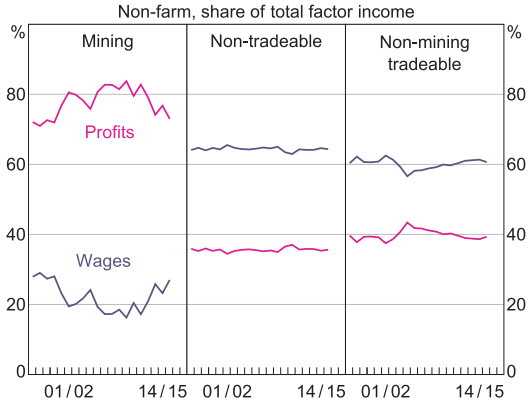
* Average earnings per hour divided by gross value added deflator
** Real gross value added per hour worked
Sources: ABS; RBA

before this new capacity was ready to produce extra output. The rise in commodity prices also gave firms an incentive to hire workers to mine more marginal resources, which also contributed to a decline in mining output per hour worked.

Nevertheless, the real production wage in mining fell by more than the decline in labour productivity, and the real unit labour costs faced by the mining industry decreased. This decline in real unit labour costs was roughly equivalent to the fall in wages as a share of income (Graph 5). Mining firms were able to capture a larger share of the sector's rising income than in the past. In those circumstances, mining companies may have been less concerned about containing costs, including labour costs, than they have been more recently. Moreover, there was an incentive to pursue investment opportunities quickly in order to take advantage of high commodity prices.

As the mining industry expanded, its demand for inputs from other sectors rose. In the non-tradeable sector, many firms benefited from providing goods and services to the mining industry, including construction, engineering, legal and accounting services (Rayner and Bishop 2013). More broadly, demand for non-tradeable goods and services rose in response to the general increase in earnings and

Graph 5
Factor Shares
Non-farm, share of total factor income



Sources: ABS; RBA

government revenues, as well as tax cuts, associated with the terms of trade boom. This increase in demand led to an increase in output price inflation in the non-tradeable sector.

The non-tradeable sector also sought to attract workers to satisfy the increased demand for its output. The increase in employee earnings necessary to attract the labour desired by the non-tradeable sector was broadly similar to the increase in the sector's output prices, so its real production wage remained little changed for a time. Productivity continued to grow, although at a slower pace than during the late 1990s. Combined, this meant that real unit labour costs declined a little.[4]

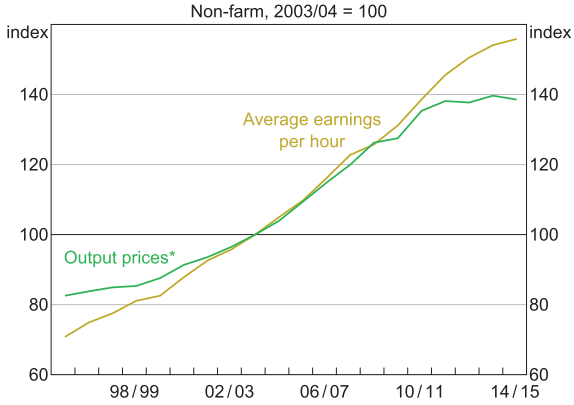
The non-mining tradeable sector did not experience such favourable conditions. While some firms in the sector saw an increase in demand for their output from the mining sector (in the manufacturing or wholesale trade industries, for example), demand for goods and services produced by many tradeable firms declined as the Australian dollar appreciated. Overall, the non-mining tradeable sector experienced a more modest increase in its output prices than other sectors.

4 While real unit labour costs declined in non-tradeable industries during the boom, the measured wage share of income was little changed. This is because real unit labour costs include the imputed cost of payments to self-employed persons, and self-employment declined as a share of total employment; payments to self-employed persons are not included in the wage share.

At the same time, the non-mining tradeable sector had to compete with other sectors for labour. Growth in employee earnings in the non-mining tradeable sector outpaced growth in output prices, so the real production wage rose. The real production wage grew by a little more than labour productivity, so real unit labour costs also picked up. Australian labour became less competitive relative to labour overseas, as nominal unit labour cost growth in Australia outpaced that in many comparable economies and the Australian dollar appreciated. Not surprisingly then, non-mining tradeable firms sought to contain their Australian labour costs. While employment in the non-mining tradeable sector had been declining as a share of total employment since the 1960s, this decline accelerated somewhat during the terms of trade boom.

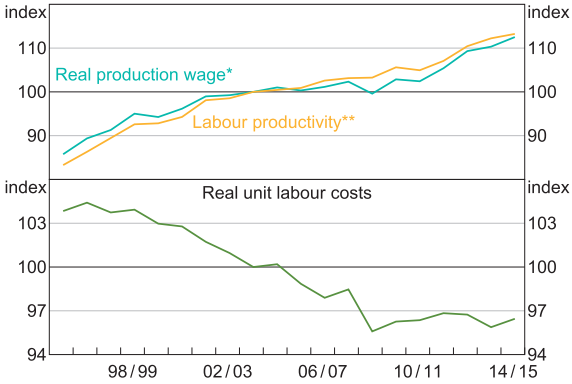
In aggregate, however, Australian firms saw a notable increase in their output prices (Graph 6). As they sought to expand and attract additional workers, employee earnings increased by a similar amount. Taken together, this meant that the aggregate real production wage was little changed throughout most of the boom (Graph 7). While aggregate labour productivity growth slowed from its strong pace in the late 1990s, it still grew by more than the real production wage, leading to a continuation of the decline in real unit labour

Graph 6
Average Earnings and Output Prices
Non-farm, 2003/04 = 100



* Non-farm GDP deflator
Sources: ABS; RBA

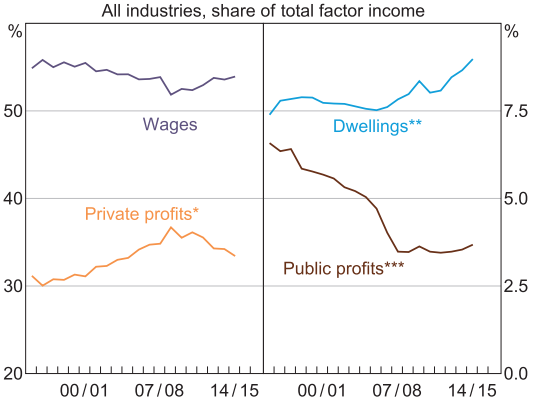
Graph 7
The Firm's Perspective
Non-farm, 2003/04 = 100



* Average earnings per hour divided by non-farm GDP deflator
** Real non-farm GDP per hour worked
Sources: ABS; RBA

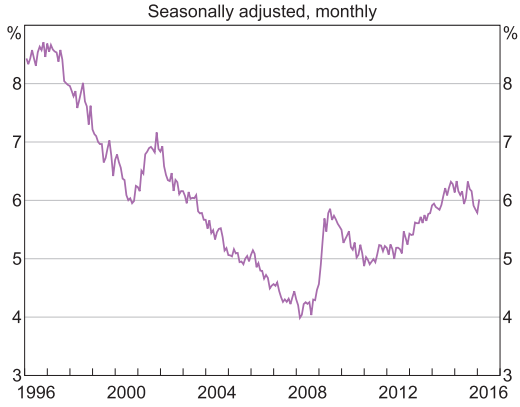
costs. As a result, an increasing share of the rising national income accrued to firms during the boom, continuing the trend of previous decades (Graph 8). Demand for labour increased notably, driving the unemployment rate down to 4 per cent (Graph 9).

Graph 8
Factor Shares
All industries, share of total factor income



* Private non-financial corporation gross operating surplus, financial corporation gross operating surplus, and gross mixed income
** Dwelling gross operating surplus
*** Public non-financial corporation gross operating surplus and general government gross operating surplus
Sources: ABS; RBA

Graph 9
Unemployment Rate
Seasonally adjusted, monthly

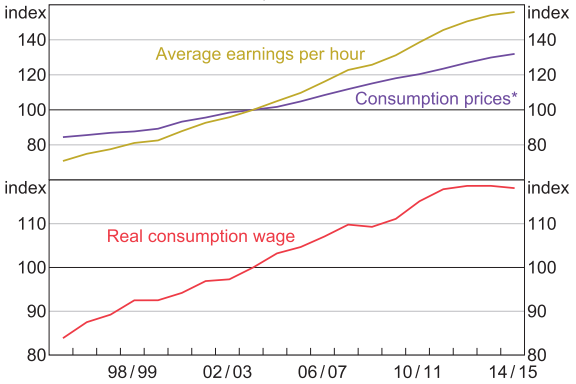


Source: ABS

The effect on households

The pace of growth in employee earnings increased during the boom, as did growth in prices of non-tradeable goods and services. However, declining import prices due to the exchange rate appreciation helped to constrain consumption price inflation. The real consumption wage increased by 17 per cent between 2003/04 and 2011/12, even though the real production wage was little changed (Graph 10).[5]

Graph 10
The Worker's Perspective
Non-farm, 2003/04 = 100



* Household final consumption deflator
Sources: ABS; RBA

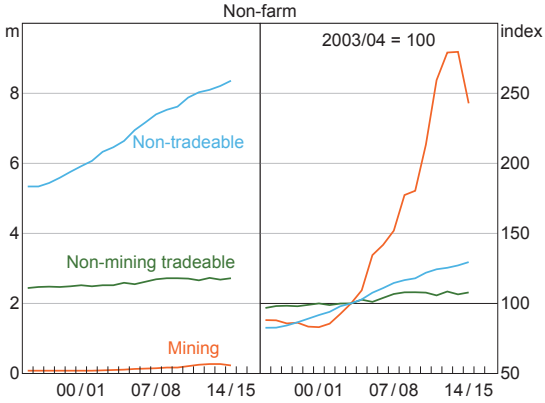
5 The labour market was only one of many channels through which Australian households benefited from the terms of trade boom; another significant channel was the tax cuts associated with the increase in government revenues (RBA 2015).

The rise in the real consumption wage may have encouraged more people to enter the labour force. The effect of higher real wages on the labour supply is theoretically ambiguous: households may work more in response to higher wages, or they may choose to work less because they can achieve the same level of income with fewer hours of work. Between 2003/04 and 2010/11, the labour force participation rate increased by almost 2 percentage points. This was partly due to the long-run upward trend in female participation in the workforce, but higher employee earnings and improved employment prospects may have also played a role. In addition, an increase in net immigration contributed to growth in the labour supply. The number of skilled workers entering Australia on temporary work (457) visas increased to meet labour shortages. There was also a larger net inflow of New Zealand citizens and working holiday makers who were seeking to take advantage of the relatively strong job and earnings prospects in Australia.

Employment also responded to differences in job opportunities across sectors and states. Narrowly defined, mining employment doubled as a share of total employment, from 1 per cent to 2 per cent between 2003/04 and 2011/12 (Graph 11). Mining-related employment in other industries also increased sharply. A range of workers transitioned from non-mining-related jobs to similar positions servicing the mining industry, such as chefs, accountants and truck drivers. Employment growth in the non-tradeable sector also picked up during the boom, and its share of total employment increased. The increase in the supply of labour was more pronounced in the mining states of Western Australia and Queensland, which experienced higher net overseas migration, an increase in interstate migration, and a larger increase in the participation rate than other states (Graph 12 and Graph 13).[6]

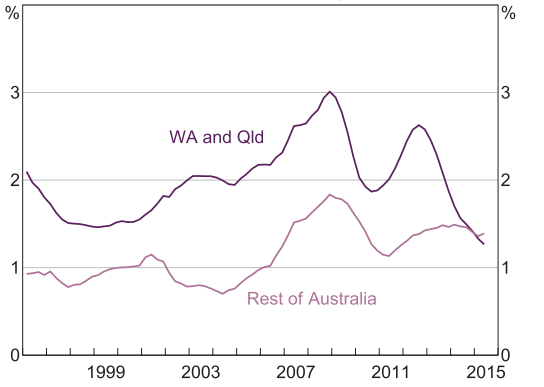
6 The increase in the participation rate may have reflected local workers joining the labour force in response to the higher returns to working. It may also have reflected the inflow of migrants, who have a higher propensity to participate in the workforce than the existing population.

Graph 11
Employment
Non-farm



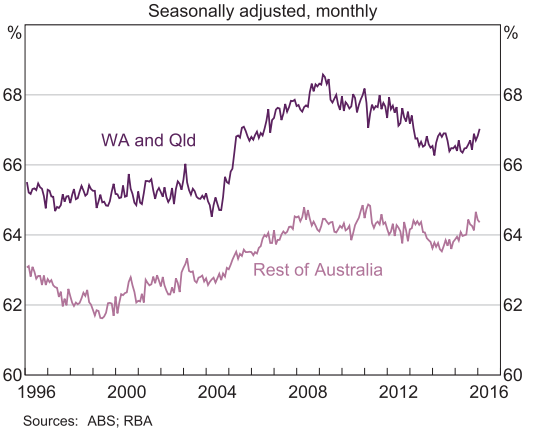
Sources: ABS; RBA

Graph 12
Population Growth
Year-ended, quarterly



Sources: ABS; RBA

Graph 13
Participation Rate
Seasonally adjusted, monthly



Sources: ABS; RBA

After the Boom

The effect on businesses

The decline in the terms of trade since 2011/12 and the exchange rate depreciation since 2012/13 have begun to reverse some, but not all, of the changes in the labour market that occurred during the boom. In aggregate, combining mining and non-mining industries, Australian firms' output prices have been little changed since the peak in the terms of trade (Graph 6). Accordingly, they have sought to restrain the pace of growth in employee earnings. The decline in the growth of employee earnings appears to have been larger than implied by the historical relationship with the unemployment rate (Jacobs and Rush 2015). While employee earnings growth has outpaced growth in output prices, and the real production wage has increased, this has been matched by an improvement in aggregate labour productivity (Graph 7). As a result, aggregate real unit labour costs have been broadly unchanged. The flexibility in employee earnings growth has prevented real unit labour costs from rising. This has provided some support to aggregate employment growth and so the unemployment rate has not risen to the extent that might otherwise have been expected.

Underlying the aggregate picture, the mining industry's output prices have declined sharply as commodity prices have fallen. Some of this decline in commodity prices was expected to occur as new resource projects in Australia and overseas began production. In anticipation of this, mining firms had limited their commitments for additional investment spending; that is, it was always to be expected that mining investment would decline. Mining production requires fewer workers than mining investment, so the mining industry's demand for workers was also expected to fall. However, commodity prices have declined by even more than anticipated, which has further reduced mining labour demand and led mining firms to attempt to reduce their labour costs more generally (Gorajek and Rees 2015).

Mining employee earnings stopped rising a few years before mining output prices peaked and were unchanged for some time (Graph 3). In 2014/15, mining employment started to decline, falling by 35 000 (Graph 11). Surprisingly, average employee earnings increased sharply in 2014/15, even though mining wage growth as measured by the wage price index continued to decline. This increase in average earnings was likely to reflect a change in the composition of mining employment towards more highly paid workers, as well as redundancy payments. Mining labour productivity also picked up in 2014/15, with employment declining and production increasing.

However, the increase in labour productivity in the mining sector was not sufficient to prevent mining real unit labour costs rising markedly over the past few years (Graph 4). The decline in the mining sector's income has been more heavily borne by profits; the wage share of mining income has returned to around its pre-boom levels (Graph 5).

The end of the boom in commodity prices and mining investment has had considerable flow-on effects to other sectors. The Bank's business liaison suggests that broad cost-cutting initiatives in the mining industry have placed significant pressure on the margins of its suppliers and these businesses have, in turn, sought to reduce the cost of their own inputs, including labour. Working in the other direction, however, low interest rates and the depreciation of the exchange rate since 2013 have helped to support aggregate demand for Australian produced goods and services.

In the non-tradeable sector, low interest rates have stimulated demand for housing assets and an increase in residential construction has provided employment for some workers laid off from mining-related construction (Doyle 2014). Liaison suggests that many of the construction workers employed in the investment phase of the mining boom had previous experience in civil and residential construction and have been able to return to jobs in these industries (though for a time

they were reluctant to do so given the lower wages on offer). Residential construction activity has also provided demand for a range of business services, including for some services that have experienced a decline in demand from the mining sector, such as engineering and legal services.

Output prices in the non-tradeable sector have continued to rise, although at a slower pace than during the resources boom. Liaison suggests that these firms have sought to contain growth in labour costs in response. Growth in employee earnings has declined but not to the same extent as output price inflation. Consequently, the real production wage has risen in this sector. However, labour productivity growth has also picked up since the end of the boom. Real unit labour costs continued to decline for a little while, but have been broadly unchanged over the past couple of years. Employment in the non-tradeable sector has continued to rise, though not at the same pace as during the boom.

Many firms producing tradeable goods and services have also experienced a decline in mining-related demand, but overall they have benefited from the exchange rate depreciation most directly. Australia's services exports have expanded noticeably in the past couple of years, with tourism, education and business services exports rising.[7] Also, imports of services have declined as Australians appear to have switched some of their expenditure to domestically produced services, including domestic holidays rather than overseas holidays. In contrast, manufactured production exports have been little changed for some time, consistent with long-term trends. Meanwhile, output prices for the wholesale industry have come under pressure as competition in the retail sector has intensified, partly because of new entrants.

7 Unfortunately, the tradeable components of education and business services are not included in the graphs in this article due to limited granularity in the data. A larger proportion of these industries cater to domestic demand than to overseas demand and, therefore, these industries are classified as non-tradeable.

The combined effect of these developments has been to reduce output price inflation in the non-mining tradeable sector. The demand for labour from tradeable firms has been mixed; some services firms have increased hiring as their exports have risen, but manufacturers and wholesalers have reduced employment. Employee earnings growth in the non-mining tradeable sector has slowed substantially, and the real production wage has stopped increasing. The sector's real unit labour costs have even declined a little over the past few years. Relative to other comparable economies, Australia's nominal unit labour costs have declined slightly. Together with the depreciation of the Australian dollar, this has helped to improve the competitiveness of Australian labour.

The effect on households

Since the peak in the terms of trade in 2011/12, growth in employee earnings has slowed to be in line with consumption price inflation, and the aggregate real consumption wage has been little changed (Graph 10). The Bank's liaison suggests that many employees have been willing to trade lower growth in earnings for greater job security. This may reflect a number of factors including: lingering concerns about job prospects following the global financial crisis; relatively weak wage growth overseas and the increasingly global nature of labour markets; perceptions that there are fewer alternative job opportunities following the end of the mining investment boom; and a decline in the bargaining power of labour. In the non-tradeable sector, growth in the real consumption wage has been less favourable than during the boom. The real consumption wage has fallen in the non-mining tradeable sector, while the mining real consumption wage has been quite volatile (partly due to compositional change).

Mining employment declined sharply in 2014/15, and is expected to fall further in the next few years (Graph 11). Employment in the in non-mining tradeable sector has remained little changed.

Meanwhile, the non-tradeable sector's employment has continued to grow, underpinning the growth in aggregate employment.

Growth in the aggregate labour force appears to have responded to developments in labour demand and real wage growth. The unchanged real consumption wage and more limited job opportunities since the end of the mining investment boom may have made working in Australia less attractive, particularly as labour market conditions have improved overseas. This appears to have been reflected in a decline in population growth owing to a fall in annual net immigration (Graph 12). This partly reflects the departure of temporary workers as many mining-related employment contracts have come to an end. However, there has also been a larger net outflow of Australian citizens and a smaller net inflow of New Zealand citizens and working holiday makers since the end of the mining investment boom. This decline in net immigration has helped the labour market to adjust without the unemployment rate increasing as much as it otherwise might have done. In addition, the labour force participation rate declined by 0.6 percentage points between 2011/12 and 2014/15, although it has recovered somewhat of late. As in the upswing, the decline in the labour force participation rate was most pronounced in the mining states (Graph 13).

Overall, even though labour's share of income has increased a little over recent years, households do not feel better off because the purchasing power of their earnings has not increased and the unemployment rate remains above its level during the boom. Nevertheless, the weaker growth in employee earnings may have encouraged firms to employ more people than otherwise.

Assessment and Outlook

In aggregate, the terms of trade boom was responsible for a large increase in firms' output prices and demand for labour, which led to a significant strengthening of the labour market and boosted the earnings of Australian households. More recently, the Australian labour market has been gradually adjusting to the decline in the terms of trade and the end of the mining investment boom. The decline in the terms of trade has weighed on firms' output prices and mining-related labour demand has fallen. There has also been a notable decline in employee earnings growth which, alongside a pick-up in productivity growth, has helped to improve the competitiveness of Australian labour and encouraged firms to employ more workers than would otherwise have been the case. The labour supply appears to have responded to weaker labour demand and lower earnings growth, with a decline in net immigration over recent years. Meanwhile, the depreciation of the exchange rate and low interest rates are working to support aggregate demand. While the unemployment rate remains higher than it was during the boom, it has declined a little over the past year or so. Many workers have been able to move from mining-related jobs to similar positions in the non-mining economy. While the adjustment still has a way to go and a further decline in mining-related labour demand is expected over coming years, the flexibility of the labour market to date bodes well for this continued transition.

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Cyclical Labour Market Adjustment in Australia

James Bishop and Michael Plumb*

Since the late 1990s, a larger share of labour market adjustment in Australia has come about via changes in average hours worked, as opposed to changes in the number of people employed. Much of this is likely to reflect that the economic downturns in the 2000s were relatively short and shallow compared with the recessions in the 1980s and 1990s. Had these later downturns been more severe, firms may have needed to shed more workers. It is also possible that labour market reforms over recent decades have provided firms with more scope to reduce labour costs by reducing working hours and wage growth rather than by reducing headcount. Consistent with these explanations, an important driver of cyclical adjustments in average hours during downturns looks to have been reductions in hours worked for employees who remained in the same job, as opposed to changes in the composition of aggregate employment.

Introduction

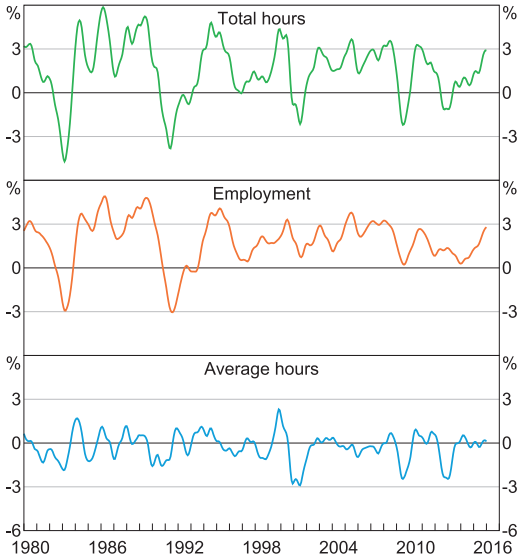
A firm's demand for labour is derived from the demand for its output. During a downturn, firms can reduce their use of labour by reducing either the number of workers they employ or by reducing the hours worked by their current employees. From an economy-wide perspective, whether this adjustment occurs through the number of employees or average hours worked by each employee has implications for the costs of a downturn. If workers have their hours reduced but remain employed, many of the costs associated with unemployment, such as skill atrophy and reliance on government assistance, are mitigated. The nature of adjustment also has implications for the measurement of spare capacity in the economy. If significant adjustment can occur through average hours then policymakers should monitor alternative measures of spare capacity – such as the *underemployment* rate, which takes into account whether employees would like to work more hours – in addition to the *unemployment* rate, which is based on headcount.

A firm's choice of whether to adjust the number of employees or the hours worked by current employees depends on a range of factors. If the cost of hiring and firing workers is non-trivial, then firms may choose to adjust hours rather than make employees redundant. Expectations of future demand are also important, as firms may be more inclined to adjust working hours if the downturn in demand is expected to be relatively short and shallow. Labour market institutions are also relevant. For example, laws and regulations or wage determination processes may provide incentives for firms to adjust the number of employees or the number of hours worked. Graph 1 provides tentative evidence that Australian firms have made use of both types of adjustment, with downturns in total hours worked reflecting declines in both employment and average hours worked.[1]

* The authors are from Economic Group.

1 In this article, total hours worked is the Australian Bureau of Statistics' (ABS) measure of 'aggregate monthly hours worked' and average hours worked is implied from total hours and employment.

Graph 1
Growth in Labour Input
Year-ended percentage change*, monthly



* Year-ended percentage changes are smoothed using a 13-period Henderson moving average

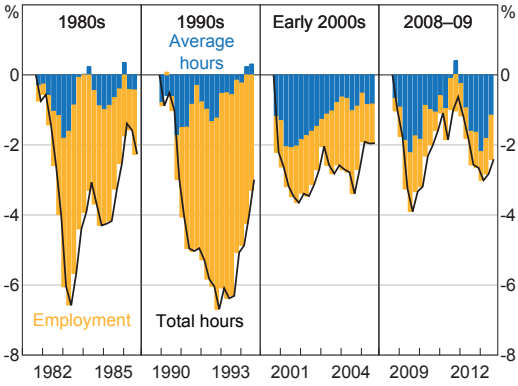
Sources: ABS; RBA

Changes in Labour Market Adjustment over Time

To analyse *cyclical* adjustments in the Australian labour market, the total hours worked, employment and average hours worked variables are detrended.[2] This helps to isolate changes related to the business cycle by abstracting from the trend decline in average hours worked since the late 1970s and the trend increase in employment. For example, while total employment was little changed during the 2008–09 downturn, it went from being 1.1 per cent above its trend level in September quarter 2008 to 0.6 per cent below its trend in September quarter 2009 – a cyclical change of –1¾ percentage points.

To assess whether labour market adjustment has changed over time, the cyclical decline in total hours worked is calculated for each of the past four economic 'downturns', as well as the contributions of employment and average hours worked to each decline (Graph 2).[3]

Graph 2
Labour Input During Downturns
Cumulative change from pre-downturn peak in total hours*



* Log-difference relative to previous peak, multiplied by 100; peaks in total hours are dated as 1981:Q3, 1989:Q4, 2000:Q3 and 2008:Q3; all series are detrended using an HP filter with smoothing parameter $\lambda = 1\,600$

Sources: ABS; RBA

The first point evident from this analysis is that the cyclical declines in total hours worked were larger in the 1980s and 1990s recessions, reflecting the greater severity of these recessions compared with the economic downturns in the 2000s. Second, in the early stages of each downturn both employment and average hours worked contributed to the cyclical decline in total hours worked. Third, cyclical declines in average hours played a role in all four downturns – ranging from 1¾ to 2¼ per cent – although the falls were larger in the downturns in the 2000s. Finally, a larger *proportion* of the declines in total hours worked during the 1980s and 1990s recessions came about through reductions in employment, rather than via average hours; employment accounted for around 75 per cent of the peak-to-trough decline in total hours worked during the 1980s and 1990s recessions, compared with a contribution of only around 45 per cent in the 2000s downturns.

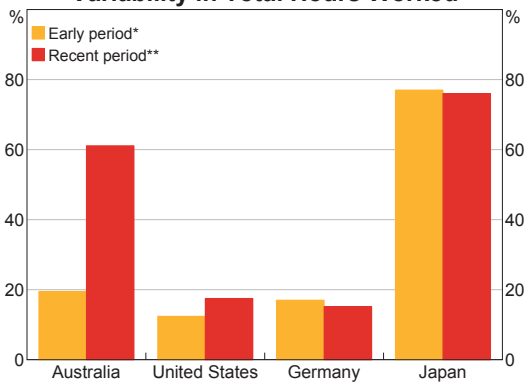
2 The series are detrended using an HP filter with smoothing parameter $\lambda = 1\,600$. Estimates of the relative cyclical adjustment between employment and average hours are not particularly sensitive to the choice of smoothing parameter.

3 The term 'downturn' is used in this article to refer to the recessions in the early 1980s and the early 1990s, and the growth slowdowns in the early 2000s and late 2000s.

Decomposing the overall cyclical variation in total hours worked since 1978 – using the entire sample and taking into account the correlation between employment and average hours – provides further evidence that relatively more adjustment has occurred through average hours worked since the late 1990s (Table 1; see Appendix A for details). While estimates suggest that average hours worked have accounted for around one-quarter of the variability in total hours worked since the late 1970s, statistical tests point to a structural break in the cyclical relationship between total hours and average hours in the late 1990s (see Appendix A). The estimated contribution of average hours tripled after the late 1990s, to 61 per cent. This reflects both an increase in the variability of average hours worked and a decrease in the variability of employment over the past two decades (Graph 1).

Comparable estimates for other countries suggest that average hours worked in Australia now play a much larger role in labour market adjustment compared to the United States and Germany, but a smaller role than in Japan (Graph 3). However, Australia is the only one of these countries to have experienced a substantial pick-up in the contribution of average hours since the 1990s. Some potential explanations for this are discussed below.

Graph 3
Contribution of Average Hours to the Variability in Total Hours Worked



* Early period is 1978–98 for Australia, 1970–90 for United States and Germany and 1970–99 for Japan

** Recent period is 1998–2015 for Australia, 1991–2009 for United States and Germany and 2000–2012 for Japan

Sources: ABS; Kakinaka and Miyamoto (2012); Merkl and Wesselbaum (2011); RBA

Table 1: Contribution to Cyclical Variation in Total Hours Worked[(a)]
Per cent

	Full sample	1978–1998	1998–2015
Employment	72	80	39
Average hours worked	28	20	61

(a) All variables are in logs and detrended with an HP filter (λ=1 600)

Sources: ABS; RBA

Why Has More Adjustment Occurred through Average Hours?

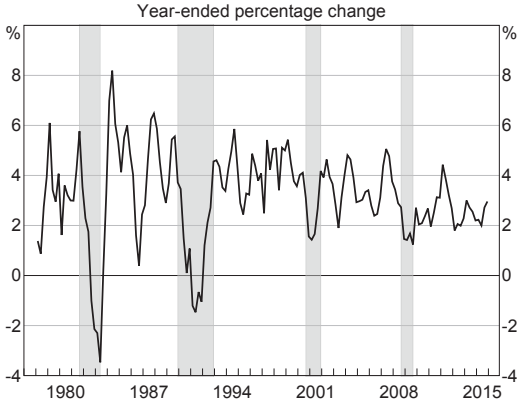
The estimated date of the break in the late 1990s provides clues as to the source of this change in the nature of labour market adjustment. This date broadly coincides with the decline in the volatility of GDP growth in Australia. Also, this followed a period of substantial labour market reforms in the 1980s and1990s. However, because these changes overlapped, it is difficult to disentangle their separate effects. The following sections discuss these influences in more detail, along with some other explanations for the rise in the importance of average hours adjustment over recent decades, such as compositional effects.

Economic downturns in the 2000s were less severe

A plausible explanation for the higher *share* of average hours adjustment since the late 1990s is that the economic downturns in the 2000s were relatively short and shallow compared to the recessions in the 1980s and 1990s (Graph 4).[4] Firms are likely to prefer to adjust to weaker demand, at least in the first instance, by reducing employees' hours rather than employee numbers because of the costs and other difficulties associated with firing employees and future rehiring. Had the downturns in the 2000s been more severe, firms may have eventually needed to shed more labour. This is consistent with analysis from the Organisation

4 The downturn periods shaded in Graphs 4, 5 and 6 are based on the peak-to-trough decline in (detrended) total hours worked.

Graph 4
Real GDP Growth*
Year-ended percentage change



* Downturns are shaded
Source: ABS

for Economic Co-operation and Development (OECD) (2010) – based on 68 recession episodes in 18 countries – which concluded that adjustments to average hours tend to make the largest contribution to the decline in labour input at the early stages of a downturn. As the downturn progresses, employers increasingly resort to reducing the number of employees. In each of the downturns shown in Graph 2, the cyclical decline in average hours accounted for around half of the adjustment during the first year of the downturn. But for the deeper recessions of the 1980s and 1990s, employment became the dominant source of adjustment as weak demand conditions persisted.[5]

The lower severity of downturns in Australia in the 2000s may help explain why it was the only country shown in Graph 3 to experience a large increase in the contribution of average hours worked. The volatility of Australian output – measured by the standard deviation of year-ended growth in real GDP – more than halved between 1978–98 and 1999–2015. In contrast, the volatility of output in the other countries was broadly unchanged, because these countries experienced much deeper downturns in the 2000s.

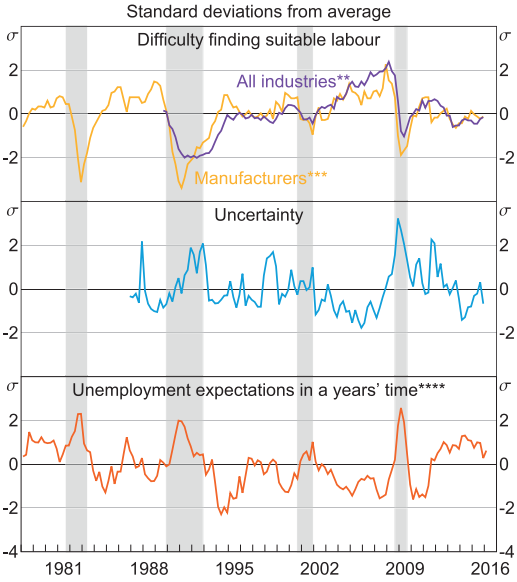
One qualification to this argument is that economic theory suggests that the decision about whether to adjust via employment or hours is influenced by both current and expected demand conditions. Thus, if firms expect a deep downturn in demand, they may be more likely to shed labour pre-emptively rather than adjust the working hours of their staff. While the 2008–09 downturn in Australia turned out to be less severe than those in the 1980s and 1990s, at the time there were widespread expectations that demand conditions would deteriorate to a similar extent to those earlier recessions (see, for example, RBA (2009)). Notwithstanding these expectations, there are a number of possible reasons why firms did not engage in more adjustment through redundancies in this episode:

- While future demand was expected to be very weak, current demand conditions at the time were not especially weak.
- The labour market was very tight in the lead-up to the 2008–09 downturn, with the unemployment rate falling to around 4 per cent and firms reporting that it was difficult to find suitable labour (Graph 5; Plumb, Baker and Spence (2010)). Given this, when growth in demand slowed, firms may have been reluctant to part with their staff to avoid the costly process of re-hiring once demand recovered.
- There was heightened uncertainty surrounding economic conditions during the 2008–09 downturn compared with previous downturns (Graph 5; Moore (2016)). In these circumstances, theory suggests that firms will be less inclined to make investment decisions that are difficult or costly to reverse, including either hiring or firing workers.
- Workers were very pessimistic about their future employment prospects during the 2008–09 downturn, with self-reported perceptions about future unemployment prospects rising

5 It is also possible that the downturns in the 2000s were less severe because more adjustment occurred through average hours. However, examining this hypothesis is beyond the scope of this article.

to unprecedented levels (Graph 5). Employees therefore may have been more reluctant to leave their jobs amid concerns about being able to find new ones, and more willing than usual to negotiate over working hours and other conditions in return for job security.

Graph 5
Determinants of Average Hours Worked*



* Downturns are shaded
** Share of firms indicating that the availability of suitable labour is a constraint on output
*** Net balance of firms finding it harder to get labour than three months ago
**** Net balance of consumers expecting unemployment to be higher in the coming 12 months
Sources: ABS; ACCI-Westpac; Moore (2016); NAB; Westpac-Melbourne Institute

Labour market deregulation and rising hiring costs

Another possible explanation for the larger contribution of average hours to labour market adjustment since the late 1990s is that the reforms to industrial relations arrangements in the late 1980s and early 1990s made it easier for firms to bargain directly with their employees over matters like wages and working hours. This may have provided firms with more scope to reduce working hours in an effort to lower labour costs while retaining employees. As noted by Borland (2011), the 2000s were the first time in which these reforms were 'tested' by an economic downturn.

In practice, measuring flexibility of the labour market and how it has changed over time is not straightforward. The cyclical adjustment in average hours was larger in the 2000s, which provides tentative evidence that the labour market reforms played a role; the peak-to-trough decline was 2¼ per cent in both downturns, compared with 1¾ per cent in the early 1980s and early 1990s recessions (Graph 2). However, these differences are fairly modest.

The cost of terminating employment and the cost of screening and training new employees can also affect the nature of labour market adjustment. If firing or hiring costs are high, firms may be more inclined to respond to weaker demand conditions by decreasing the hours worked by existing staff. The average employment termination payment in Australia was nearly $14 000 in 2012/13, or 25 per cent of an average annual salary.[6] Broader measures, such as the OECD's Employment Protection Legislation (EPL) index, suggest that firing costs in Australia are lower than in most European countries, although higher than in the United States where employment protection is relatively limited.[7] However, these indicators showed little change between the mid 1980s and late 2000s for Australia, so it is unlikely that changes in firing costs have been a significant driver of changes in the nature of labour market adjustment.

In terms of hiring costs, the cost of screening and training labour is likely to have risen over time, given the increase in the number of jobs requiring specialist skills and training (Faccini and Hackworth 2010). Hiring costs are particularly high during

6 These calculations are based on the total value of employment termination payments (ETP) and income from salary or wages from the Australian Taxation Office (ATO 2015). The value of ETP measures the taxable component of payments related to resignation, dismissal, redundancy, retirement or death.

7 The EPL index is available from the mid 1980s and covers a range of termination cost indicators including dismissal costs, procedural inconveniences (i.e. 'red tape'), notification requirements and the potential compensation if a dismissal is found to be unfair.

periods of labour market tightness, since firms face higher search costs to fill vacant jobs. This might suggest that higher hiring costs can explain part of the increase in the contribution of average hours adjustment over time. However, it cannot explain why average hours adjustments have become more important in Australia but not in other advanced economies, since these countries are also likely to have seen an increase in the cost of screening and training labour.

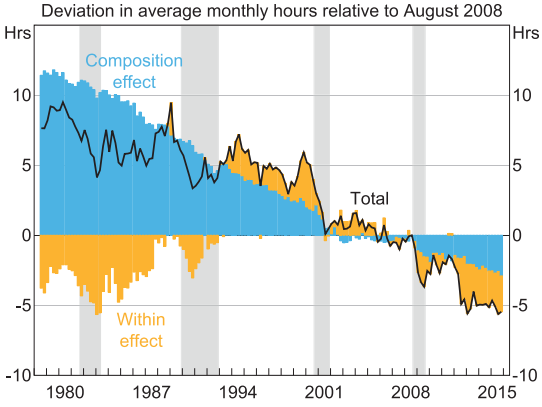
Changes in the composition of employment

Average hours worked are affected not just by changes in the hours of workers in given jobs, but also by changes in the composition of employment between jobs involving long hours of work and jobs involving fewer hours. Falls in average hours worked could reflect changes in the industry composition of the economy during a recession. For example, if industries with longer working hours incur relatively more job losses during an economic downturn, this will contribute to a decline in overall average hours worked. Thus, another possible explanation for larger adjustments in average hours worked since the late 1990s is that compositional effects were larger than in the earlier period.

To estimate whether compositional changes have played a role, deviations in average hours worked can be decomposed into two effects (Graph 6; see Appendix B for details):

- A 'composition effect', which is the change in average hours worked owing to shifts in different categories of employment, while holding hours unchanged within each category. Within-category hours are kept at their August 2008 levels, and the categories include age group, gender, industry and occupation of employment, marital status and part-time and full-time employment status.
- A 'within effect', which captures changes in average hours worked within each category of employment; for example, a fall in average hours worked by employees within the manufacturing sector or a fall in average hours worked within part-time employment.

Graph 6
Composition and Average Hours Worked*
Deviation in average monthly hours relative to August 2008



* Downturns are shaded
Sources: ABS; RBA

The decline in average hours since the late 1970s is entirely due to longer-run changes in the composition of employment. In particular, part-time employment has grown rapidly relative to full-time employment. However, during downturns, the primary driver of shifts in average hours is changes in average hours worked within categories, rather than changes in the composition of employment.[8] The 'within effect' contributed more than two-thirds of the peak-to-trough decline in average hours worked in the 1980s and 1990s recessions and more than half in the 2000s downturns. While compositional effects were relatively more important in the 2000s – and therefore may account for some of the increased contribution of average hours adjustments – they do not appear to have been the main driver.

Greater insights into the within-job shift to shorter working hours during downturns can be gleaned

8 The 'within effect' is not the same as the 'cyclical' average hours worked series derived earlier using the HP filter. The 'within effect' captures all changes in average hours that are not explained by compositional changes in employment. In contrast, the 'cyclical' change in average hours captures all deviations of average hours from trend, due to both cyclical 'within effects' and cyclical 'composition effects'. Nonetheless, the two series are highly correlated, reflecting the limited contribution of compositional effects to cyclical movements in average hours.

by looking at the individual-level data underlying the ABS's Labour Force Survey (LFS). The main benefit of these data is that they are longitudinal in nature, meaning that individual workers can be tracked over the period of time during which they remain in the sample to see if they had their hours reduced. The main disadvantage of these data is that they are only available for the period 2008 to 2010, meaning that analysis is restricted to the most recent downturn.

Bishop, Gustafsson and Plumb (forthcoming) analyse the LFS individual-level data and find that the main driver of the decline in average hours during the 2008–09 downturn was a reduction in hours worked by workers who remained in the same job. Compositional changes – which the authors define more broadly to also include the churn of workers between jobs in the same industry and occupation – accounted for *at most* one-half of the overall fall in average hours worked during the downturn, and probably less. This finding is consistent with the idea that, where possible, firms made adjustments via reduced hours, rather than by firing employees. The reductions in hours worked for those staying in the same job were largest for workers in industries that had experienced skills shortages prior to the downturn. Firms in these industries may have been 'overutilising' staff prior to the downturn, and started to reduce hours to more normal levels as demand eased. As discussed earlier, firms may also have been reluctant to let go of skilled workers because labour had been so difficult to source just prior to the downturn.

Have Average Hours Worked Become More Sensitive to the Cycle?

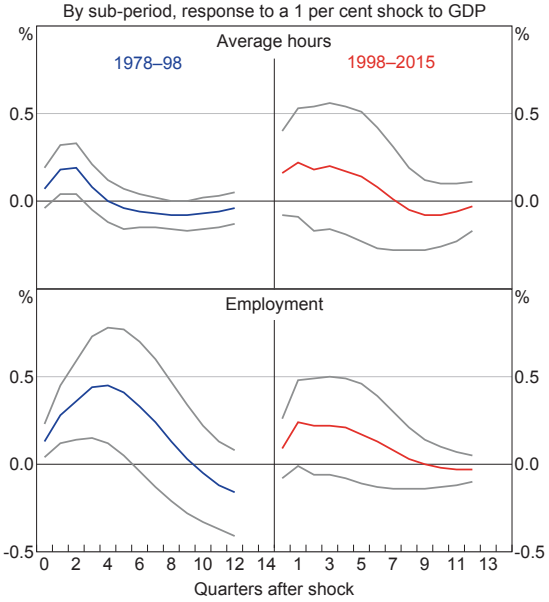
The analysis in the previous sections suggests that the less severe nature of downturns in the 2000s, labour market deregulation and increases in hiring costs may all help explain the increased role of changes in average hours in Australian labour market adjustment since the 1990s. However, it is not possible to distinguish between these explanations using statistical techniques given the available data, as all imply that changes in average hours worked have become more sensitive to changes in the business cycle since the late 1990s.

- If average hours adjust more during the initial stages of a downturn and only up to a point, then econometric models would tend to find that average hours worked are relatively more responsive to changes in GDP during smaller downturns (and relatively less responsive during larger downturns, in which more adjustment occurs through employment). Since the downturns in Australia were less severe after the late 1990s, this suggests that the relative sensitivity of average hours worked to a given change in GDP should have risen in recent decades.
- Labour market reforms and rising hiring costs suggest that the sensitivity of average hours to a given change in GDP should have increased (or that the sensitivity of employment has decreased, or both). Given that many important labour market reforms had been completed by the late 1990s, the relative sensitivity of average hours worked should have increased after the late 1990s.

Nevertheless, it is useful to test whether *at least one* of these explanations contributed to the changes in labour market adjustment in Australia in recent decades. One way of exploring whether labour market variables have become more or less sensitive to the cycle is to estimate a Vector Autoregression (VAR) model, which captures the dynamic relationships between GDP, average hours worked and employment.[9] The response of labour market variables to a positive 1 per cent 'shock' to GDP is shown in Graph 7. The left- and right-hand

9 The results in Graph 7 are from a VAR(3) model with three variables, ordered as follows: real GDP, average hours worked and employment. Following RBA (2014), this ordering assumes that GDP is the most exogenous variable in the system, with the ordering of the other variables reflecting the relative speed at which they are assumed to respond to a shock to GDP. In turn, GDP is assumed not to respond contemporaneously to any of the labour market variables, but may respond with a lag. All variables in the VAR are in logs and detrended with an HP filter (λ=1 600). The results from VAR models can be sensitive to the variables included and the structure of the VAR, so the results shown here should be considered as illustrative only.

Graph 7
Response of Labour Input to a GDP Shock
By sub-period, response to a 1 per cent shock to GDP



Sources: ABS; RBA

panels show the impulse response functions (IRFs) estimated over the 1978–98 and 1998–2015 sub-samples, respectively, along with the +/– 2 standard error bands. Comparing the left- and right-hand panel reveals whether the relationship between GDP and each variable changed over time.

In general, the volatile and noisy nature of measures of average hours worked makes it difficult to find empirical evidence of relationships between average hours worked and the other variables that should, in theory, be related to it. That said, the VAR model provides some tentative evidence that average hours became more sensitive to the cycle after 1998, although the difference between the IRFs in the two sub-periods is not statistically significant. The model also suggests that the responsiveness of employment declined after 1998, although again the difference between the sub-periods is not statistically significant. Thus, while it is difficult to draw any firm conclusions from this model, it seems likely that either the reduction in the severity of downturns or labour market reforms (or both) explains at least part of the greater contribution of average hours to labour market adjustment in recent decades.

Conclusion

Since the late 1990s, a larger share of cyclical labour market adjustment in Australia has come about via changes in average hours worked, as opposed to changes in employment. Much of this is likely to reflect that the economic downturns in the 2000s were relatively short and shallow compared to the recessions in the 1980s and 1990s. Had these later downturns been more severe, firms may eventually have needed to shed more workers than they did. In other words, both employment and average hours tend to adjust in the early stages of a downturn, but relatively more adjustment occurs through employment as the downturn persists and becomes more severe. It is also possible that labour market reforms over recent decades have provided firms with more scope to reduce labour input by reducing working hours and wage growth rather than by redundancies.

Appendix A

The estimates in Table 1 are based on the decomposition outlined in Merkl and Wesselbaum (2011). The contribution of average hours to cyclical adjustment in total hours is given by $\theta^A \equiv \text{Cov}(tothrs_t, avhrs_t) / \text{Var}(tothrs_t)$, where $tothrs_t$ and $avhrs_t$ are total hours worked and average hours worked, respectively. All variables are in logs and detrended using an HP filter with smoothing parameter $\lambda = 1\,600$. The estimate gives the proportion of variation in total hours that derives from average hours, both directly and indirectly through its correlation with employment. Similarly, the contribution of employment to cyclical adjustment in total hours is given by $\theta^E \equiv \text{Cov}(tothrs_t, emp_t) / \text{Var}(tothrs_t)$, where emp_t is employment. These estimates are equivalent to the slope coefficients in simple ordinary least squares (OLS) regressions of average hours on total hours and employment on total hours, respectively.

Using alternative methods to detrend the data does not affect the main conclusions. Using four-quarter log differences rather than the HP filter does not have a material effect on the results. Using one-quarter log differences suggests a larger role for average hours adjustments prior to 1998 relative to the other detrending methods, although this is likely to reflect the high quarter-to-quarter volatility in the average hours data.

OLS estimates of θ^A and θ^E might be biased due to the mechanical relationship between the dependent variable and the regressor. To obtain a consistent estimator of the parameters, an instrument for total hours can be used; in this case, two lags of HP-filtered real GDP were chosen. Similar to the OLS estimates, the two-stage least squares estimates suggest that the contribution of average hours increased substantially after the late 1990s.

The regression framework also allows us to perform the Quandt-Andrews structural break test for an unknown break point. The test is for a break in the coefficient in the regression equation, although also allowing for a break in the constant does not change the result. Using a Chow test, there is evidence of a statistically significant break in 1998:Q2 when using alternative detrending methods such as one-quarter-ended or four-quarter-ended log differences, rather than the HP filter.

Appendix B

Rather than considering all potentially relevant compositional factors individually (e.g. age, gender, industry, part-time/full-time), a multiple regression-based approach can be used to consider the combined effect of these variables simultaneously. This approach can be used to estimate the effect of compositional shifts in employment on the change in average hours worked between August 2008 and any given quarter since the late 1970s.

The first step is to estimate a regression using data on individual workers from the August 2008 cross-section of the LFS:

$$H_{i,2008} = \alpha + \mathbf{X}'_{i,2008}\boldsymbol{\beta} + u_i$$

where $H_{i,2008}$ is actual hours worked per month by individual i, $\mathbf{X}_{i,2008}$ is a vector of explanatory variables and $\boldsymbol{\beta}$ is the vector of coefficients to be estimated. The regression is weighted using the ABS's population weights. The explanatory variables include: age group (11 dummies), gender (1 dummy), industry (18 dummies), occupation (7 dummies), marital status (1 dummy), whether the employee was born in Australia or another main English or non-main English-speaking country (2 dummies), and whether the worker is an employee, employer or self-employed (2 dummies).

The contribution of compositional change to the overall change in average hours between August 2008 and quarter t is given by

$$\left(\bar{\mathbf{X}}'_{i,t} - \bar{\mathbf{X}}'_{i,2008}\right)\hat{\boldsymbol{\beta}}$$

where $\hat{\beta}$ is a vector of estimated coefficients from the August 2008 cross-section of the LFS and $\bar{\mathbf{X}}_{i,2008}$ and $\bar{\mathbf{X}}_{i,t}$ are the means across individuals of the observed values in August 2008 and quarter *t*, respectively. This is referred to as the 'composition effect'. While LFS micro data are not currently available on a consistent basis prior to 2008 or after 2010, $\bar{\mathbf{X}}_{i,t}$ is available from the published LFS employment time series data. The 'composition effect' measures the change in average hours that would have occurred between August 2008 and quarter *t* if all within-category (e.g. within-industry and within-age group) hours had remained constant at their August 2008 levels. The difference between the actual change in average hours and the 'composition effect' measures the effect on average hours of changes in hours within categories of employment, holding composition constant.[10] In this article, this is referred to as the 'within effect'.

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10 This approach is equivalent to estimating an Oaxaca decomposition between August 2008 and every other quarter *t*. However, rather than estimating a separate regression for every quarter in time (along with August 2008) it simply treats any difference between the actual change and the composition effect as the 'unexplained (or within) effect'.

Developments in Banks' Funding Costs and Lending Rates

Kelsey Wilkins, George Gardner and Blair Chapman*

This article updates previous Reserve Bank research on how developments in the composition and pricing of banks' funding have affected their overall cost of funds and influenced lending rates. Major banks' outstanding funding costs fell notably in 2015, following two reductions in the cash rate. The spread between the major banks' outstanding funding costs and the cash rate also narrowed over 2015. This was due to lower costs of deposits and a more favourable mix of deposit funding, as well as lower wholesale funding costs. Lending rates declined in the first half of 2015, reflecting changes in the cash rate and competition for lending, before lending rates increased for housing in the second half of the year; business lending rates are at historically low levels.

Introduction

In setting lending rates, banks consider a number of factors. A key consideration is their cost of funding, which reflects the composition and price of the various liabilities (including deposits) issued by banks (Hack and Fabbro 2011). Banks also take into account risk premia, including the credit risk associated with loans, and the liquidity risk involved in funding long-term assets with short-term liabilities. Banks' growth strategies, competition and the desired return to equity holders also affect banks' lending rates.

An important element in determining the overall cost of banks' funding is the level of the cash rate, which acts as an anchor for the broader interest rate structure of the domestic financial system. Nevertheless, changes in the level of compensation demanded by investors to hold bank debt, competitive pressures and non-price factors (such as funding composition) can influence banks' funding costs significantly. There is typically some delay before the full effect of changes in these factors flows through to funding costs and lending rates. In part, this reflects the time that it takes for balance sheet liabilities to be repriced, particularly those with longer terms to maturity.

* The authors completed this work in Domestic Markets Department.

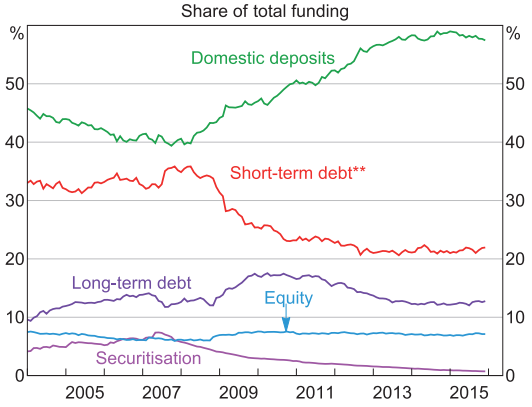
The Reserve Bank Board takes developments in banks' funding costs and lending rates into account when it determines the appropriate setting of the cash rate. The Board aims to ensure that interest rates faced by households and businesses are consistent with the desired stance of monetary policy. The following analysis updates previous Reserve Bank research and focuses on developments in banks' funding costs and lending rates over 2015 (Tellez 2015).

Funding

Composition

Banks fund themselves with a combination of liabilities, which includes deposits and wholesale debt, along with equity. Over the past decade banks have made less use of wholesale funding – particularly short-term debt – and more use of domestic deposits (Graph 1). Banks began increasing their share of deposit funding following the global financial crisis as they sought more stable forms of funding. The share of deposit funding stabilised at just below 60 per cent of total funding liabilities in 2014, an increase of nearly 20 percentage points in six years. More recently, the

Graph 1
Funding Composition of Banks in Australia*

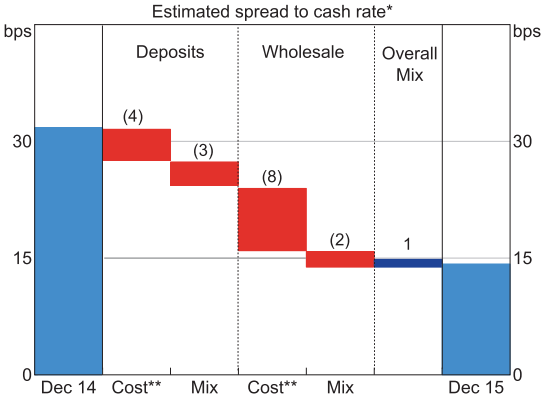


* Adjusted for movements in foreign exchange rates; tenor of debt is estimated on a residual maturity basis

** Includes deposits and intragroup funding from non-residents

Sources: APRA; RBA; Standard & Poor's

Graph 2
Major Banks' Debt Funding Costs



* RBA estimates; numbers represent contributions to the overall change in the spread and may not add to the total due to rounding; bracketed numbers represent negative contributions

** Includes the cost or benefit of interest rate hedges

Sources: APRA; Bloomberg; RBA; UBS AG, Australia Branch

share of deposit funding has declined a little as the relative cost of wholesale debt has fallen and the major banks have raised equity to meet upcoming changes to prudential regulation.

Debt funding costs

In aggregate, debt funding costs (hereafter 'funding costs') for the major banks are estimated to have fallen by around 70 basis points over 2015, partly reflecting a reduction in the cash rate of 25 basis points in February and then again in May. The spread of major banks' funding costs to the cash rate is estimated to have narrowed over 2015 owing to the fact that both deposit rates and wholesale funding costs declined by more than the cash rate in the year (Graph 2). Compositional shifts within the mix of deposits and wholesale funding also contributed to the narrowing in the spread.

Much of the fall in funding costs relative to the cash rate occurred over the first half of 2015, with major banks' outstanding funding costs estimated to have been relatively stable over the second half of the year. Notwithstanding these developments, the spread of major banks' funding costs to the cash rate remains higher than it was in the period before the global financial crisis.

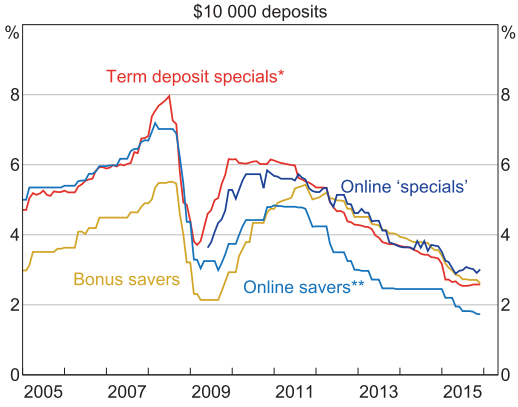
Deposit funding

Over 2015, declines in major banks' overall deposit costs relative to the cash rate were driven roughly in equal part by lower deposit rates and changes in the composition of deposits. An easing of competition in the deposit market saw the cost of deposits contribute 4 basis points to the lower spread of total funding costs to the cash rate. Banks were able to price their deposit products such that the flow of deposits was predominantly into at-call and transaction accounts, rather than into more expensive term deposit funding. This resulted in a change in the composition of deposits that contributed a further 3 basis points to the reduction in the funding cost spread to the cash rate.

Deposit interest rates

Interest rates offered on the majority of deposits declined over the year, roughly in line with reductions in the cash rate. Some interest rates declined further, reflecting reduced demand for deposit funding by the banks (Graph 3). The outstanding costs on bonus and online savings accounts declined the most over 2015 (by between 70 and 95 basis points). For term deposits, the outstanding cost is estimated to have declined by almost 70 basis points as deposits

Graph 3
Major Banks' Deposit Rates
$10 000 deposits



* Average of 1–12, 24-, 36-, and 60-month terms
** Excludes temporary bonus rates
Sources: Canstar Cannex; RBA

that were issued at higher rates matured and were replaced by new deposits at lower rates, which incorporated the changes in the cash rate.

At-call savings accounts (such as bonus and online savers) and transaction accounts have been a preferred source of deposit funding by banks for some time. One reason for this is that banks are able to adjust the rates on these accounts (and hence, costs) instantaneously, rather than setting the rate for a fixed period. Also, these current accounts tend to be a more stable source of funding in the medium term and, reflecting this, they are treated more favourably than term deposits maturing within 30 days under the current prudential Liquidity Coverage Ratio (LCR) framework (APRA 2014).

Banks continue to offer term deposit specials for attracting deposits with a specific term to maturity, providing some control over the maturity profile of these deposits. Typically, these specials are for terms of 3–4, 6–8 or greater than 12 months and offer an additional 10–40 basis points on standard rates.

Following the implementation of the LCR, the majority of banks introduced non-breakable clauses on their term deposit accounts. This ensures that the term deposit does not attract a penalty under the LCR for as long as the term to maturity of the deposit remains greater than 30 days.

While interest rates on bonus and online saver accounts are, in some instances, above those for term deposit 'specials', the former accounts typically require additional funds to be deposited regularly or have limits on monthly withdrawals to be eligible for the higher interest rates. Some proportion of funds in bonus and online saver accounts do not meet these conditions and so have significantly lower effective interest rates than advertised. For instance, some bonus saver accounts currently offer bonus interest rates of around 260 basis points, but require that no withdrawals be made to be eligible for the interest. For online specials, most 'base rates' fell by more than the cash rate, while the 'special' component of the interest rates increased.

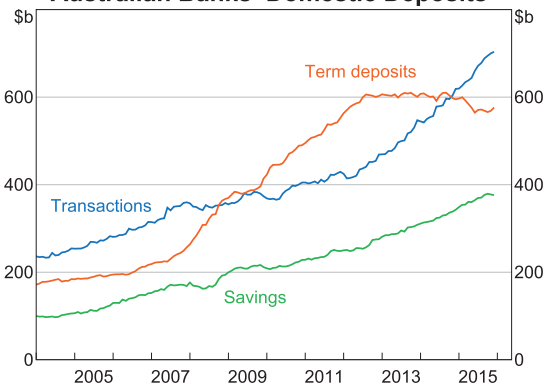
Some banks offer notice accounts to customers, which require a minimum notice period (often 31 days) to withdraw funds. These are another form of stable funding for banks. Advertised interest rates on these accounts tend to be in line with term deposit 'specials' and, to date, these accounts have not become a substantial source of funding.

Deposit mix

Consistent with the large fall in interest rates on term deposits, the level of term deposits in the system declined in 2015, mostly due to some maturing deposits not being rolled over. In contrast, transaction and at-call savings deposits grew strongly in the year (Graph 4). Throughout 2015, banks also adopted pricing strategies aimed at reducing deposits from institutional depositors (such as superannuation funds), which are more costly to banks under the LCR framework.

The change in the mix of deposit funding lowered the cost of those funds by 3 basis points owing to particularly strong growth in transaction deposits, which carry lower interest payments. In part, this reflects the rapid growth of mortgage offset account balances through 2015, where funds are typically deposited in zero-interest rate accounts but are used to reduce the calculated interest on the associated mortgage (Graph 5). One implication of the increased use of such accounts is the high

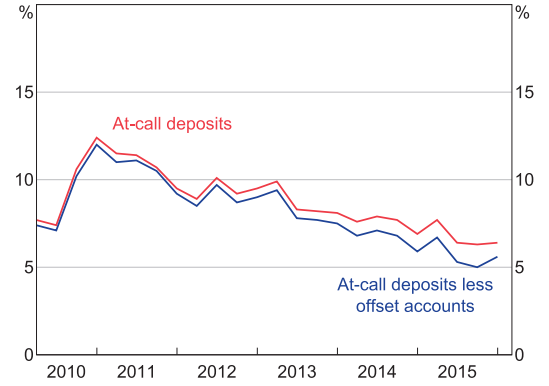
Graph 4
Australian Banks' Domestic Deposits*



* Break-adjusted; not seasonally adjusted; excludes foreign currency deposits and certificates of deposit

Sources: APRA; RBA

Graph 5
Domestic Deposit Growth*
At-call deposits; year-ended



* Break-adjusted; not seasonally adjusted; excludes foreign currency deposits and certificates of deposit

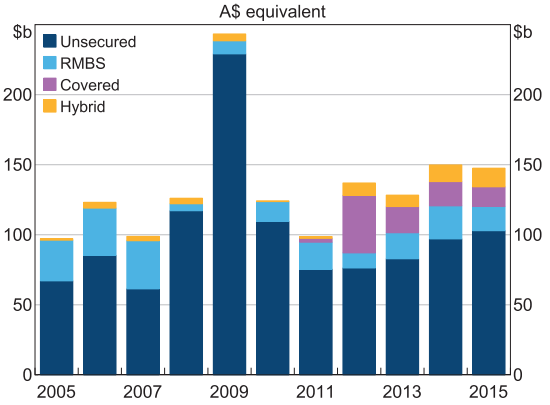
Sources: APRA; RBA

'implied' cost of funds for banks – equivalent to interest forgone on mortgages. Interest rates on mortgages are much higher than those on deposit products, so banks implicitly pay their customers the mortgage rate on funds held in offset accounts. However, money held in offset only accounts for about 6½ per cent of at-call deposits.

Wholesale funding

The volume of bank bond issuance in 2015 was broadly similar to the previous year, although banks issued slightly less in covered bonds and residential mortgage-backed securities (RMBS) (Graph 6).

Graph 6
Australian Banks' Wholesale Issuance
A$ equivalent



Source: RBA

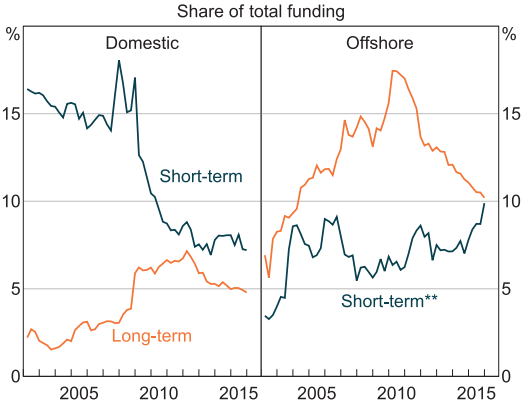
Issuance of hybrid securities (hybrids) has steadily increased since 2012, and banks' hybrid issuance was slightly higher in 2015 than the previous year, possibly reflecting proposed international prudential standards which call for a higher share of such funding. The mix of wholesale funding outstanding was little changed over the year. A shift from offshore long-term debt to offshore short-term debt contributed to a marginal reduction in funding costs for the major banks (Graph 7).[1] However, the share of major banks' total funding from offshore short-term debt remains below that for the banking sector as a whole, reflecting the fact that some other institutions, particularly foreign banks, make more extensive use of such funding (Graph 8).

During 2015, declines in wholesale funding rates and the roll over of existing higher-rate funding lowered the major banks' funding costs by 8 basis points more than the reduction in the cash rate. Yields on major banks' senior unsecured debt largely moved in line with sovereign and swap rates, and yields in 2015 were on average lower than in the previous

1 Short-term offshore wholesale funding is defined as non-resident deposits and non-resident debt securities issued overseas with a residual maturity of less than 12 months (inclusive of Australian dollar-denominated and foreign currency-denominated securities), as reported to APRA. Residual maturity is useful for assessing banks' funding task for the period ahead, but overstates the *issuance* of new short-term debt and understates long-term issuance. The data presented in Graph 7 and Graph 8 are on an *original* maturity basis, however, which is useful for examining banks' access to the relevant markets.

Graph 7
Major Banks' Wholesale Funding*

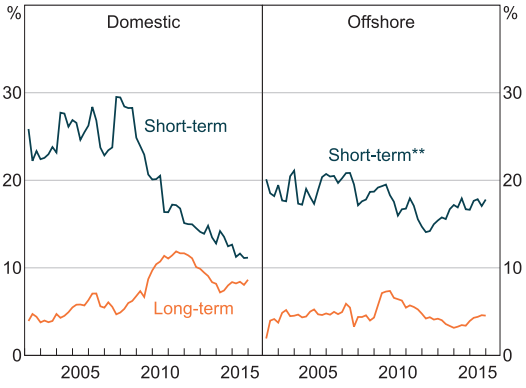
Share of total funding



* Adjusted for movements in foreign exchange rates
** Includes deposits and intragroup funding from non-residents
Sources: APRA; RBA

Graph 8
Non-major Banks' Wholesale Funding*

Share of total funding



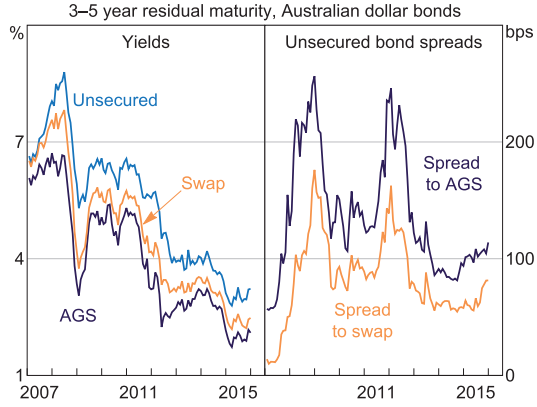
* Adjusted for movements in foreign exchange rates
** Includes deposits and intragroup funding from non-residents
Sources: APRA; RBA

year (Graph 9). The modest widening in spreads on bank debt to Australian Government securities (AGS) and swap rates towards the end of the year was associated with perceptions of increased global macroeconomic risks and a rise in the cost of funding in other markets, particularly in US dollars.

The all-up cost to banks of issuing new wholesale debt fell substantially at the beginning of 2015. The lower level was sustained through most of the year. This gradually flowed through to outstanding wholesale funding costs as the new cheaper debt replaced higher cost maturing funding (Graph 10).

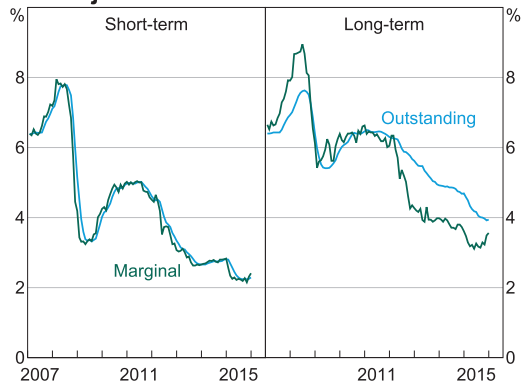
Graph 9
Major Banks' Bond Pricing

3–5 year residual maturity, Australian dollar bonds



Sources: Bloomberg; UBS AG, Australia Branch

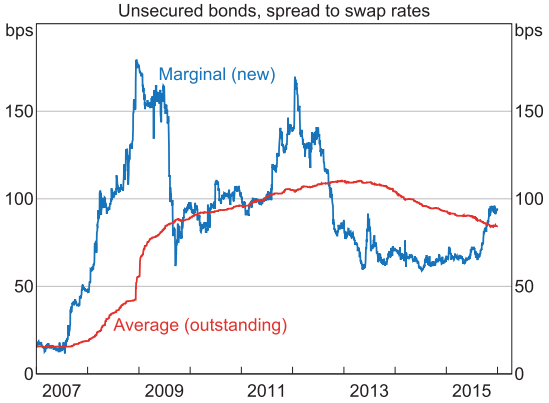
Graph 10
Major Banks' Wholesale Debt Cost*



* RBA estimates; rates include currency hedges but not interest rate hedges
Sources: Bloomberg; RBA

Towards the end of 2015, the cost of issuing new debt increased. Yields on new short-term debt rose to be higher than those on outstanding short-term debt, while the cost of new long-term debt was a little below the cost of corresponding outstanding debt. One component of the cost of long-term debt is the spread which banks pay above the swap rate (interest rate swaps are used to convert fixed rate debt into floating rate debt). The estimated spread to the swap rate on new issuance in the domestic market rose to be slightly above the average of outstanding issuance, which suggests that there is some upward pressure on funding costs once the cost of hedging is taken into account (Graph 11).

Graph 11
Major Banks' Domestic Bond Spreads
Unsecured bonds, spread to swap rates



Sources: Bloomberg; RBA; UBS AG, Australia Branch

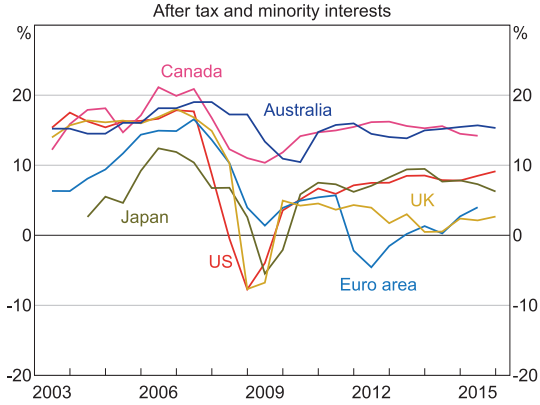
While the cost of hybrid funding outstanding has fallen by around 30 basis points over 2015, it remains costly relative to other wholesale funds and accounts for only a small share of total funding.

Cost of equity

Although equity tends to be a relatively small share of banks' aggregate balance sheets – around 6½ per cent – it is generally more expensive than debt, so small changes in equity funding shares can have proportionately large effects on total funding costs. Unlike debt funding, equity funding does not involve a legally contracted obligation to return the principal amount or pay a given return on funds. Given this, the cost of equity is the return that equity providers (shareholders) require in order to invest in the bank. For example, if potential shareholders will only invest in a bank if it makes a 10 per cent return on that equity – that is, annual returns after tax are 10 per cent of the amount of equity invested – then that is the cost of equity. Banks do not necessarily need to 'pay out' these returns, although they may distribute some of it in the form of dividends. If the required return is not achieved, or a bank does not pay a dividend, this is not a default and does not have the same consequences as when the bank fails to meet its debt obligations.

The *ex ante* cost of equity is not directly observable. However, historical data suggest that the major banks have provided a return on equity of around 15 per cent, which is relatively high by international standards (Graph 12).

Graph 12
Large Banks' Return on Equity*
After tax and minority interests



* Number of banks: Australia (4), Canada (6), Euro area (41), Japan (4), United Kingdom (4) and United States (18); adjusted for significant mergers and acquisitions; reporting periods vary across jurisdictions

Sources: Banks' annual and interim reports; Bloomberg; RBA; SNL Financial

As noted earlier, the major banks raised a significant amount of equity in 2015 – around $21 billion – in anticipation of upcoming changes to prudential regulation (RBA 2015). These include announced increases to the share of equity funding to be required when making mortgages, as recommended by the Financial System Inquiry (2014), which comes into effect on 1 July 2016.

The adjustment to the cost of additional equity can occur in three ways, which are not mutually exclusive. First, banks can raise the return on assets (e.g. interest rates on lending) in order to maintain historical returns on equity. Indeed, the banks cited the cost of equity as the reason for raising housing lending rates by 15–20 basis points in November (see below). Second, they can absorb the cost of the additional equity by allowing their return on equity to decline; it is estimated that if major banks had not recovered any of the additional cost of capital, their return on equity would have declined

by around 1½ percentage points. However, higher capital levels reduce the risk of bank failure, which may result in a lower risk premium in the cost of equity. Third, because the additional equity reduces risk, debt funding costs may also be lower, which could offset some of the effect of the higher cost of the equity funding.

Other Australian Banks

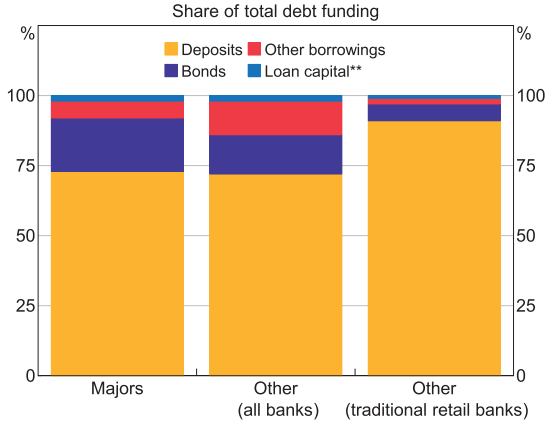
In aggregate, the other Australian banks' funding liabilities look similar to the major banks (Graph 13). However, there is greater variation in the funding composition of this group than exists between the major banks. The other Australian banks with a more traditional retail structure have a much higher use of deposit funding, at around 90 per cent of non-equity funding. These are smaller institutions with more limited access to capital markets. For those banks with less traditional structures, that is, those with large non-banking financial activities, the deposit share is in some cases closer to 50 per cent.

Prior to the global financial crisis, the aggregate funding costs of the major and other Australian banks followed each other fairly closely (Graph 14).[2] However, following the crisis a notable gap emerged, with funding costs for the other Australian banks around 105 basis points higher than for the majors from 2009 to 2011. Although this gap narrowed somewhat over subsequent years, it has widened again more recently to be around 75 basis points in 2015.

The primary driver of the difference in aggregate funding costs for the other Australian banks compared to the major banks since the crisis has been a divergence in the cost of both deposit and wholesale funding. This may suggest that investors and depositors now differentiate more between the risks of different banks than they did prior to the global financial crisis.

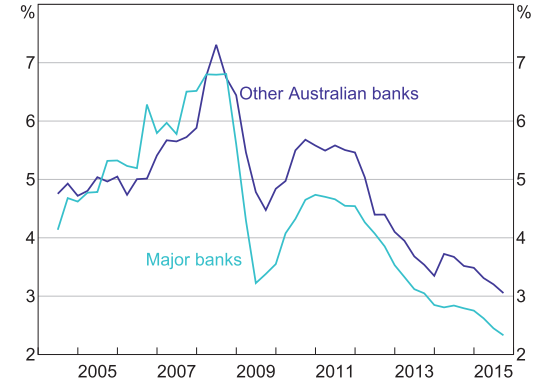
2 Owing to the use of alternative data sources, the data for major and other Australian banks in this section are *not* directly comparable to the data for major banks in other parts of this article.

Graph 13
Australian Banks' Debt Funding Liabilities*
Share of total debt funding



* Average since January 2010
** Subordinated loans with a maturity of more than one year
Sources: APRA; RBA

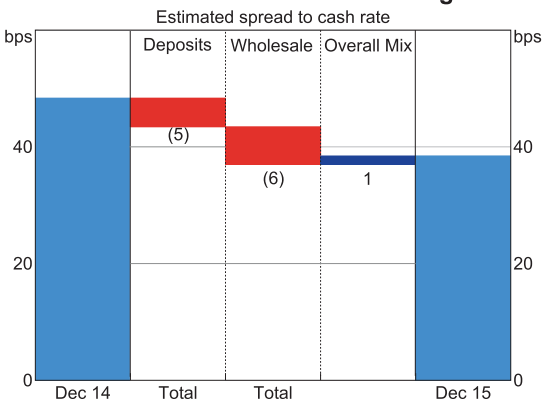
Graph 14
Bank Debt Funding Costs*
By type



* Weighted average
Sources: APRA; RBA

The spread of other Australian banks' funding costs to the cash rate decreased by around 10 basis points over the year to December (Graph 15). The change in the spread was due to the cost of deposits and wholesale funding decreasing by more than the cash rate, similar to developments for the major banks. This was partially offset by a compositional shift in funding towards wholesale debt, which remains a more expensive source of funding than deposits.

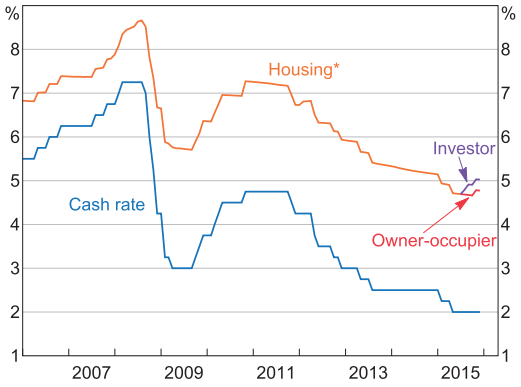
Graph 15
Other Australian Banks' Debt Funding Costs*



* RBA estimates; numbers represent contributions to the overall change in the spread and may not add to the total due to rounding; bracketed numbers represent negative contributions

Sources: APRA; RBA

Graph 16
Interest Rates



* Estimated outstanding rate

Sources: ABS; APRA; Perpetual; RBA

Lending Rates

Housing rates generally declined in line with the cash rate in the first half of 2015, with the average outstanding interest rate on mortgages falling by around 50 basis points over that period.

In the second half of the year, however, banks adjusted their lending rates such that the average outstanding housing interest rate for investor loans was only modestly lower over 2015, while rates for owner-occupiers declined by roughly 30 basis points over the year (Graph 16). Interest rates on investor loans were increased midyear, following concerns raised by APRA about the pace of growth in lending to investors. Increases in investor lending rates ranged from around 20–40 basis points, and were applied to both new and existing investor loans.

In November, the major banks raised mortgage rates across both investor and owner-occupier loans by 15–20 basis points, citing the cost of raising additional equity to meet incoming regulatory requirements. Of particular relevance, the Financial System Inquiry's Final Report recommended higher capital requirements for banks using 'advanced' risk modelling (the major banks and Macquarie Bank) in order to reduce a competitive disadvantage relative to other mortgage lenders (FSI 2014). The other Australian banks similarly increased mortgage lending rates, despite not facing the same regulatory costs as the major banks.

Business rates generally fell by more than the cash rate in 2015, with large business rates falling by around 70 basis points and small business rates by around 60 basis points. These lending rates remain at historic lows. Banks reported that declines in business rates beyond the changes in the cash rate were driven by intense competition for lending, including from the Australian operations of foreign lenders.

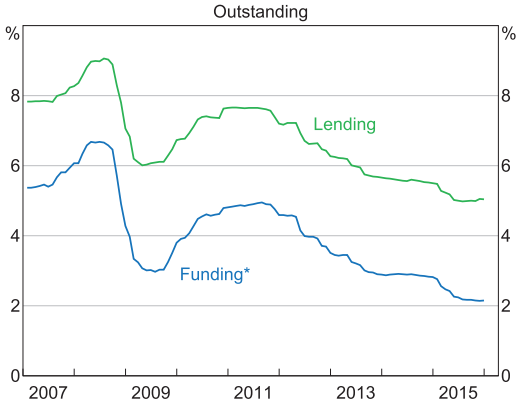
Banks' Implied Spread

Major banks

The major banks' implied spread, being the difference between average lending rates and debt funding costs, increased by around 20 basis points over 2015. This change was driven in roughly equal parts by the decline in average funding costs relative to the cash rate, and an increase in the average lending rate. However, lending rates and debt funding costs tend to move in line with each other in the longer run (Graph 17).

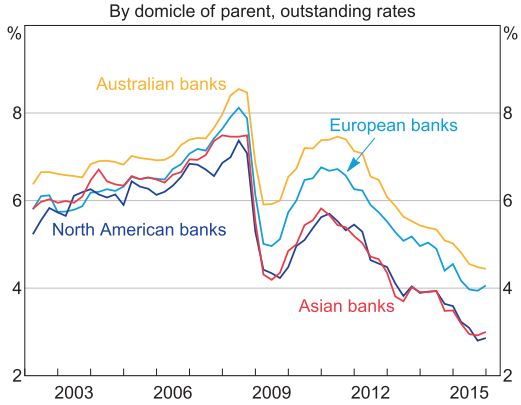
The contribution to the aggregate implied spread from higher lending rates was entirely due to increases in housing lending rates, with the implied

Graph 17
Major Banks' Lending and Funding Rates
Outstanding



* Assumes interest rate swaps and replicating portfolio hedges
Sources: APRA; Banks' financial reports; Bloomberg; RBA; UBS AG, Australia Branch

Graph 18
Banks' Business Lending Rates*
By domicile of parent, outstanding rates



* RBA estimates; weighted average rates
Sources: APRA; RBA

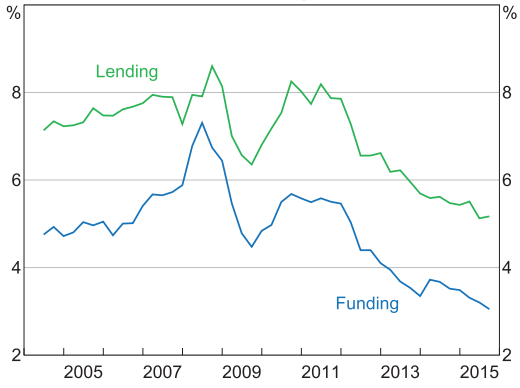
spread on housing lending now higher than the previous peak in 2009. However, the measure of funding costs used to calculate implied spreads does not account for the increased share of relatively expensive equity funding. As such, the increase in the implied spread for housing lending is likely to overstate the true change in major banks' margins for this activity.

Implied spreads on business lending declined over 2015. Consistent with strong competition, implied spreads on large business lending have returned to pre-global financial crisis levels, when there was strong competition, business conditions were highly favourable and risk premia were compressed. Much of the competition is coming from foreign banks, with the average rate on business loans written by foreign banks significantly lower than the rate being charged by Australian banks (Graph 18).

Other Australian banks

The average implied spread on other Australian banks' lending has been around 25 basis points lower than for the major banks since 2005. However, there is considerable variation in implied spreads of the other Australian banks, driven more by the high variation in lending interest rates across banks than variations in funding costs (Graph 19).

Graph 19
Other Australian Banks' Lending and Funding Rates*
Outstanding



* Weighted average lending and funding rates
Sources: APRA; RBA

In contrast to the major banks, the spread on other Australian banks' lending for housing declined over 2015 with their lending rates falling by more than their funding costs. The other Australian banks' spread on business lending also decreased in 2015. The spread on business lending remains higher for the other Australian banks, which reflects the fact that these banks generally lend more to smaller business than the major banks, and do not compete as heavily with the major and foreign banks on large business lending.

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The ATM System since the 2009 Reforms

Darren Flood and Stephen Mitchell*

The past seven years have seen two major forces affecting the ATM system. Reforms to pricing arrangements in 2009 have had a number of effects, including establishing an environment that has encouraged a rise in ATM numbers. More recently, the ATM industry has been affected by a shift in consumer preferences towards payment cards, which has seen a decline in cash use and a resulting fall in the demand for ATM services. This article examines how activity and pricing in the ATM system have evolved since 2009. It finds that while ATM transactions are declining, ATM numbers at this stage continue to increase overall. ATM direct charges have risen slightly in real terms, but the number of withdrawals on which a fee is charged has fallen significantly.

Introduction

The evolution of the ATM system in Australia in recent years has been shaped by two distinct forces. First, reforms to the ATM industry were introduced in 2009 which resulted in a new pricing structure that allowed ATM owners to set their own prices ('direct charges') for ATM transactions for the first time. This replaced highly inflexible and opaque interchange fee arrangements negotiated between the main industry participants. The reforms led to the entry of many new ATM owners into the industry, an increase in ATM numbers and the placement of ATMs in locations where they would not previously have been commercially viable. It also meant that the price of ATM transactions could change more readily over time.

The second force affecting the industry is a general decline in the use of cash for payments, leading to a decline in the demand for ATM services. This is likely to become the dominant force on the industry in the years to come.

This article examines how the ATM system has responded to these two forces to date, firstly by examining trends in ATM transactions and numbers. It then considers how ATM direct charges have evolved since the 2009 reforms. This is based on a comprehensive survey of the ATM industry conducted by the Reserve Bank in 2015 – the first of its kind since 2010.[1]

The article finds that ATM use is now in decline, even though overall ATM numbers continue to rise. Direct charges, on average, have risen slightly in real terms but the amount spent on ATM fees has fallen, reflecting declines in both the number of withdrawals and the proportion of withdrawals on which a direct charge is paid.

Background

Australians benefit from a universal ATM system whereby they can transact at any Australian ATM, regardless of whether the ATM is owned by their own financial institution or another party. This arrangement is supported by fees to allow the owner of the ATM to be remunerated for providing ATM services to another institution's customers; financial

* The authors are from Payments Policy Department.

1 In July–August 2015, the Reserve Bank conducted its third survey of the ATM industry (covering around 97 per cent of all ATMs). The Bank's first survey was conducted in early 2010 to review the effects of the move to direct charging after a year of operation (Filipovski and Flood 2010). A subsequent survey was conducted in late 2010–early 2011 as part of the joint Australian Treasury and Reserve Bank ATM Taskforce examining competition and transparency, and issues affecting Indigenous communities in relation to ATMs (RBA and Treasury 2011a, 2011b); this survey was also discussed in Flood, Hancock and Smith (2011).

institutions typically do not levy an explicit fee on their own cardholders for use of their own ATMs.

The nature of ATM fees changed in 2009 when a set of reforms was introduced by the Australian payments industry, with support from the Reserve Bank. Prior to the reforms, when a consumer made a transaction at an ATM that was not owned by their own financial institution (a 'foreign transaction'), their financial institution paid an 'interchange fee' of around $1.00 to the ATM owner. The financial institution then passed that fee (and often more) on to their customer as a 'foreign fee' that was visible to the cardholder only on their subsequent monthly statement. By 2009, a foreign fee of $2.00 was common, double the typical interchange fee.

The Reserve Bank was concerned about the inflexibility and lack of transparency of these fee arrangements and in 2009 interchange fees and foreign fees were removed. Instead, ATM owners were allowed to charge cardholders directly for making an ATM withdrawal, provided that the direct charge was disclosed clearly to the cardholder and the cardholder was given an opportunity to cancel the transaction (at no charge). The flexibility in pricing that this brought made it possible for owners to place ATMs in high-cost or low-volume locations where the interchange fee might previously have been insufficient to make an ATM commercially viable (e.g. regional and remote locations, and temporary events such as festivals). It has also made it possible for ATM owners to adjust prices over time.

Market Structure

The Australian ATM system consists of two distinct types of ATM owners – financial institutions and independent deployers. Financial institutions maintain networks of ATMs largely as a service to their own cardholders. Because cardholders can typically transact on their own institution's ATMs without paying a fee, a financial institution that has a larger ATM network may be more attractive to depositors. The fact that financial institutions provide ATMs as part of a bundled account service to their customers means that they do not necessarily need to cover the cost of their ATM fleets through ATM fees alone.

Independent ATM deployers operate standalone ATM networks, unaffiliated with financial institutions. They do not have their own cardholder base and must therefore rely solely on the fees generated by ATM transactions. They typically charge for all transactions.

Because the 2009 reforms significantly changed the economics of ATMs for independent deployers, there has been much more volatility in this segment of the market than among financial institutions. In the years following the introduction of the direct charging reforms, a large number of independent deployers (at least several dozen) entered the ATM industry. However, following this initial period of expansion there has been some consolidation. A number of smaller players have exited the industry, while the largest independent deployer, DC Payments, has expanded, in part through the acquisition of fleets of smaller deployers such as EzeATM, GRG and OneCash.

In 2015, around 55 per cent of Australian ATMs were independently owned, up from 47 per cent at the start of 2010. This change in share reflects much stronger growth in independently owned ATMs than financial institution ATMs. The two largest independent networks – DC Payments and Cashcard – are now significantly larger than any of the financial institution networks, though most cardholders have access to a network of several thousand ATMs provided free of charge by their own financial institution (Table 1).

Because a large proportion of ATM transactions at financial institution ATMs are fee-free, those ATMs tend to generate much higher transaction volumes than independently owned ATMs. Even though financial institution ATMs make up less than half the national fleet, 75 per cent of all ATM withdrawals and 90 per cent of balance enquiries were conducted at ATMs owned by financial institutions in 2014/15 (Table 2). This equates to around

130 transactions per machine per day at financial institution ATMs, compared with an average of 30 per day at independently owned machines. Other things equal, this implies higher costs per transaction for independent ATM deployers, given the large fixed costs associated with ATM purchase and installation.[2]

Table 1: Number of ATMs – Major Networks[(a)]
July 2015

Network	Number
DC Payments	7 251
Cashcard	4 691
Commonwealth Bank and Bankwest	3 822
RediATM (including NAB)	3 089
Westpac and St. George	3 055
ANZ	2 606
CashConnect	1 857
Next Payments	1 080
Bendigo Bank	868
Suncorp	681

(a) A small number of ATMs that carry financial institutions' branding, but are owned or operated by an independent deployer, are recorded in data for independent deployers; other similar arrangements are recorded under financial institutions
Source: RBA

Trends in ATM Numbers and Transactions

The 2009 reforms encouraged an increase in the number of ATMs, as financial institutions sought to ensure that they had a network that was attractive to depositors and independent deployers took advantage of pricing flexibility to find new ATM sites. Growth in overall ATM numbers has continued; according to the Australian Payments Clearing Association (APCA) there were 31 661 ATMs in Australia in December 2015, an increase of around 20 per cent since 2008 (Graph 1). This represents over 1 300 ATMs per million inhabitants, which is relatively high by international standards (Graph 2).

The growth in ATM numbers stands in contrast to ATM transactions, which have declined in recent years. The latter reflects two factors.

First, the increased transparency of ATM fees following the 2009 reforms led to a marked change in cardholder behaviour. Cardholders reduced their overall use of ATMs, with the number of withdrawals falling by 7 per cent in the first year (Graph 3). They also began making greater use of their own banks' ATMs in preference to ATMs where they would pay a direct charge.[3]

Table 2: ATM Activity by Type of Owner[(a)]

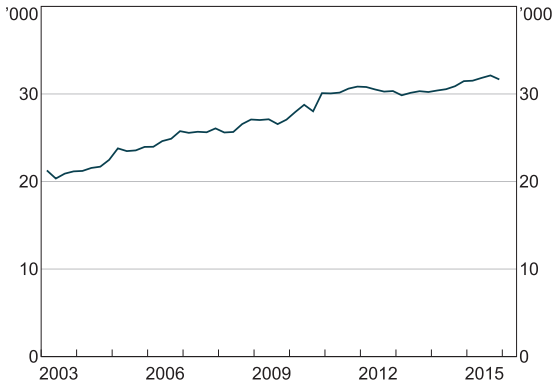
	Number of ATMs July 2015	Number of withdrawals 2014/15 (millions)	Number of balance enquiries 2014/15 (millions)	Transactions per machine per day
Financial institutions	13 876	510.4	139.1	128
Per cent of total	*45*	*75*	*90*	
Independent deployers	17 295	168.9	15.3	29
Per cent of total	*55*	*25*	*10*	
Total	**31 171**	**679.3**	**154.4**	**73**

(a) A small number of ATMs that carry financial institutions' branding, but are owned or operated by an independent deployer, are recorded in data for independent deployers; other similar arrangements are recorded under financial institutions
Source: RBA

2 These may be offset to a degree by the fact that independent deployers tend to install less sophisticated, and therefore lower-cost, machines.

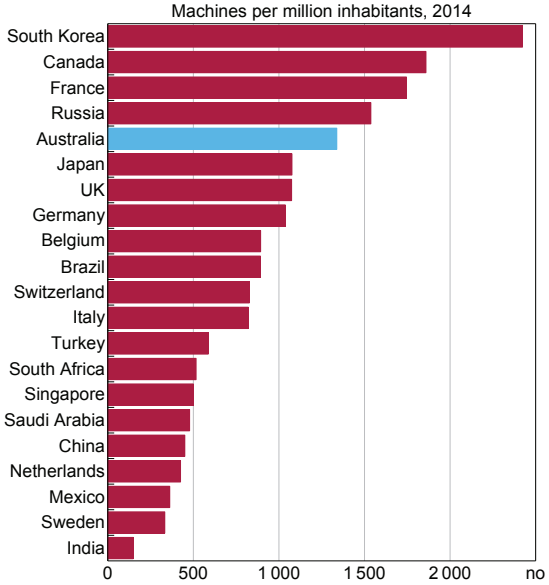
3 In the year following the reforms, the number of 'foreign' withdrawals fell by around 20 per cent, though this underestimates the shift in behaviour; cardholders also moved to using foreign ATMs that could be accessed free of charge under commercial arrangements between the cardholder's financial institution and an ATM owner.

Graph 1
Number of ATMs in Australia



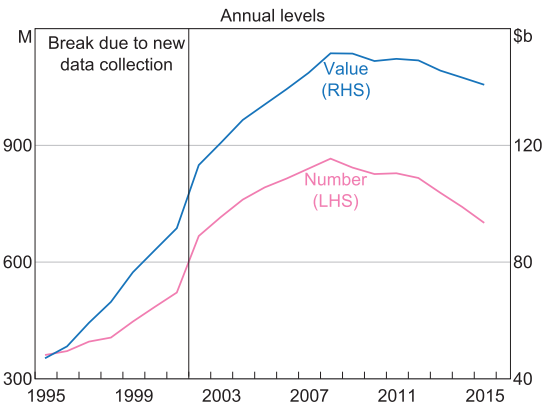
Source: APCA

Graph 2
Number of ATMs
Machines per million inhabitants, 2014



Source: BIS

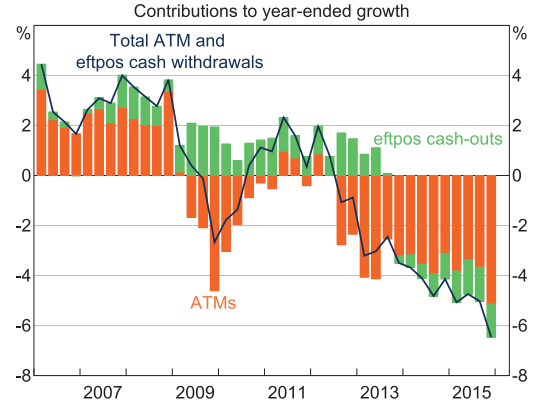
Graph 3
ATM Withdrawals*
Annual levels



* Includes both domestic and international ATM cash withdrawals on Australian-issued cards

Source: RBA

Graph 4
Number of Cash Withdrawals – ATM and eftpos
Contributions to year-ended growth

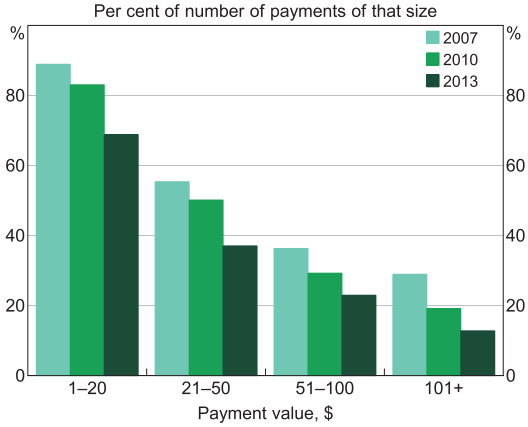


Source: RBA

It appears that some of the fall in ATM withdrawals at this time was offset by increased use of eftpos cash-out, which is generally free to cardholders (Graph 4). This increased by around 10 per cent in the two years following the reforms, with cash-out's share of cash withdrawals increasing from around 20 per cent prior to the reforms to 26 per cent currently. The patterns of cardholder behaviour established at this time have largely become entrenched and, if anything, have become more marked over time.

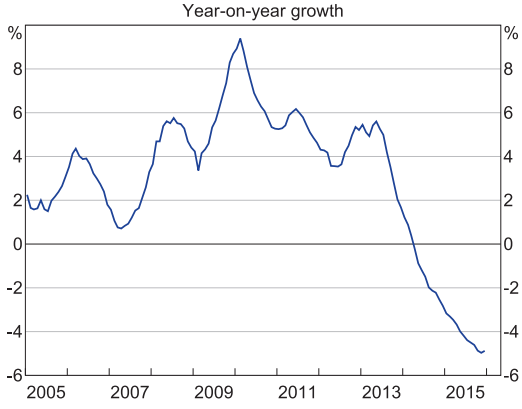
The second factor affecting ATM transactions has become prominent more recently. The use of cash is now declining, with consumers opting to use electronic forms of payment – particularly payment cards. The Bank's 2013 Consumer Payments Use Survey indicated that consumer cash payments fell from 69 per cent of payments in 2007 to 47 per cent in 2013, declining across all payment values (Ossolinski, Lam and Emery 2014) (Graph 5).

Graph 5
Cash Use by Payment Size
Per cent of number of payments of that size



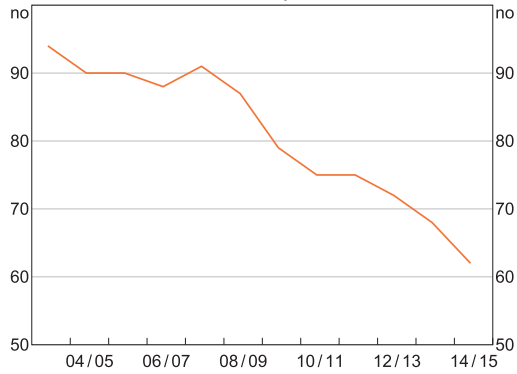
Source: RBA surveys, conducted by Colmar Brunton and Roy Morgan Research

Graph 6
Number of eftpos Cash-outs
Year-on-year growth



Source: RBA

Graph 7
Withdrawals per ATM*
Per day



* Annual transaction volumes, with the number of ATMs as at June

Sources: APCA; RBA

It is likely that this trend has accelerated since 2013, with the widespread adoption of contactless card payments and the increasing use of cards for lower-value transactions. As might be expected, reduced cash use has resulted in a reduction in demand for ATM services. Since 2013, the number and value of ATM cash withdrawals have declined by an average of around 4 per cent and 2 per cent respectively each year (Graph 3). The number of withdrawals is now 25 per cent below its 2008 peak. Confirming the effect of reduced cash use, eftpos cash-outs have also declined since 2013 and are now 15 per cent below their peak (Graph 6).

Declining cash use will be a challenge for the ATM industry. In combination with rising ATM numbers, it has resulted in a fall in withdrawals per ATM from around 75 per day in 2010, to 60 per day in 2015 (Graph 7). This is placing upward pressure on costs per transaction and may affect pricing and future ATM deployment decisions.[4] The recent rises in ATM numbers are unlikely to continue longer term and numbers ultimately can be expected to decline with falling cash use.

4 Though this must be weighed against other factors, including falling costs of communications and ATM purchase and maintenance offset by rising site rental costs. Owners of ATMs may also take into account the strength of demand for their respective sites; e.g. it may be easier to pass on cost increases for ATMs in locations where alternative cash withdrawal methods or electronic payments are not readily available.

ATM Direct Charges

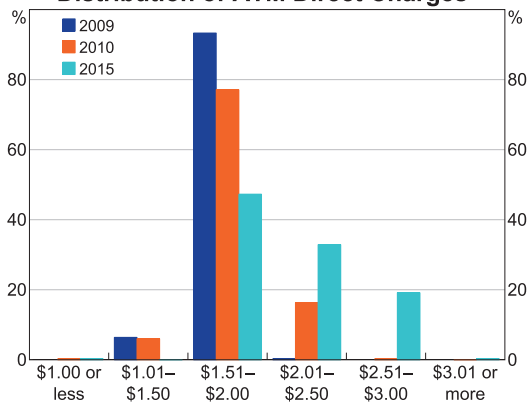
There are no regular, comprehensive data on how ATM owners have set ATM direct charges for foreign withdrawals or the proportion of withdrawals on which a charge is paid. However, the Reserve Bank from time to time conducts a survey of the industry to determine how charges and cardholder behaviour are evolving. The most recent of these was conducted in 2015 and shows a small increase in the average direct charge in real terms, but a reduction in fees paid overall resulting from fewer charged transactions.

Average direct charges for withdrawals and balance enquiries have risen since the previous survey in 2010. The average direct charge for a foreign withdrawal in July 2015 was $2.33, up from $2.04 in 2010 and $1.96 in 2009 (Table 3).[5] While this represents a rise of around 19 per cent in nominal terms since the first direct charges were introduced in 2009, in real terms the increase was only 2 per cent. As discussed, this has occurred in an environment where there has been a shift away from the use of cash for payments and a decline in ATM withdrawals.

The increase in average direct charges for withdrawals has been driven primarily by independently owned ATMs. Direct charges on these ATMs now average $2.57, up from $2.00 in 2009, an increase of around 29 per cent. Among financial institution ATMs, the average foreign withdrawal fee is $2.02. This is consistent with pre-reform foreign fees, but higher than the $1.93 average in 2009, reflecting National Australia Bank's decision to increase fees by 50 cents in 2013 to match the $2.00 charged by the other major banks.

These changes are reflected in the distribution of ATM fees (Graph 8). In 2009, over 90 per cent of ATMs charged $2.00 for a withdrawal with very few ATMs above that level. While in 2015 $2.00 remains the most common withdrawal charge, close to one-third of ATMs now charge either $2.20 or $2.50, and close to one-fifth charge from $2.75 to $2.90.

Graph 8
Distribution of ATM Direct Charges*



* 2009 data are for March, 2010 for December and 2015 for July
Source: RBA

The range of independent ATM withdrawal fees recorded in the most recent survey is zero to $5.00, with 99 per cent of fees in the $2.00 to $3.00 range.[6] For banks, the range of fees is $2.00 to $2.50, with over 95 per cent levying a fee of $2.00.

Only a small number of ATMs are at the very high or very low end of the range. For instance, 102 ATMs (0.3 per cent of an overall sample of 31 000 ATMs) charged more than $3.00 in 2015. Twenty-five ATMs charge the highest fee recorded of $5.00; deployers report that these tend to be located in adult venues. On the other hand, around 90 ATMs do not levy a direct charge on either withdrawals or balance enquiries.

Table 3: ATM Direct Charges[(a)]
Average across ATMs, $

	Withdrawals			Balance enquiries		
	2009	2010	2015	2009	2010	2015
Financial institutions	1.93	1.94	2.02	1.61	1.68	2.01
Independent deployers	2.00	2.15	2.57	1.42	1.96	2.26
Total	**1.96**	**2.04**	**2.33**	**1.52**	**1.82**	**2.15**

(a) A small number of ATMs that carry financial institutions' branding, but are owned or operated by an independent deployer, are recorded in data for independent deployers; other similar arrangements are recorded under financial institutions; 2009 data are for March of that year, 2010 for December and 2015 for July
Source: RBA

5 The averages quoted here, unless specified otherwise, are in terms of averages across ATMs, not across ATM transactions.

6 The Reserve Bank has also been made aware of a small number of independently owned ATMs utilising a 'variable pricing' model. These are not included in the survey data.

Average direct charges on balance enquiries are lower than withdrawals, at $2.15, but they have risen at a somewhat faster rate – 63 cents or 41 per cent since 2009. In this case, financial institutions and independent deployers have both contributed to the increase. Two-thirds of balance enquiry fees remain at $2.00 or less, compared with close to 100 per cent in 2010.

While there has been a modest rise in average direct charges on foreign ATM transactions since 2010, the number of ATM transactions on which a fee is charged has been declining. Estimates from the latest survey indicate that a direct charge was paid on around 28 per cent of all withdrawals in 2014/15, down from around 33 per cent in early 2010.[7] In absolute terms, the number of charged withdrawals declined by around 20 per cent between 2010 and 2014/15, suggesting that, in total, cardholders paid around $60 million less for withdrawals than in 2010. Combining ATM withdrawals and eftpos cash-outs, around 80 per cent of all cash withdrawals do not attract a fee.

The decrease in charged transactions is likely to have been even more marked for balance enquiries, where many cardholders now have ready access to account information via internet and mobile banking. In 2014/15, less than 20 per cent of all ATM transactions were balance enquiries, but most of these were on ATMs provided by the cardholder's own financial institution. Overall, a direct charge was paid on 10 per cent of balance enquiries.

Conclusion

In the seven years since direct charging at ATMs was introduced, Australia has seen greater availability of ATM services, resulting from strong growth in ATM numbers. Average direct charges on foreign withdrawals have risen over that time – but at a rate only marginally higher than inflation. The number of withdrawals on which a direct charge is paid has declined by around 20 per cent since 2010, implying a $60 million reduction in fees paid. Seventy-two per cent of ATM withdrawals (and 80 per cent of ATM and eftpos withdrawals combined) now do not incur a fee.

The period ahead may be challenging for the ATM industry, with cash use and ATM transactions now clearly declining. To date, independent deployers have responded to rising costs per transaction by raising charges, but this approach might in itself encourage changed behaviour by some consumers, including the use of electronic payments in preference to incurring ATM fees. With innovation in electronic payments likely to continue at pace and online commerce growing, these pressures could intensify in the coming years.

7 This is broadly consistent with the findings of the Bank's most recent Consumer Payments Use Survey, which found a decrease of around 8 percentage points between 2010 and 2013.

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The Australian Government Guarantee Scheme: 2008–15

Carl Schwartz and Nicholas Tan*

The Australian Government Guarantee Scheme for Large Deposits and Wholesale Funding (the Guarantee Scheme or scheme) was introduced during the global financial crisis in response to similar measures taken in other countries, and to address extreme funding pressures on authorised deposit-taking institutions (ADIs). The scheme closed to new borrowings in early 2010 and the guarantee over the few remaining liabilities ended in late 2015. This article recaps the operation of the scheme and concludes that it successfully met its objective to promote financial stability and the flow of credit to the economy during a period of extreme global funding pressures. No claims against the government were made under the scheme and the fees paid for its use generated $4½ billion in revenue.

Background to the Guarantee Scheme

The Guarantee Scheme was introduced at a time of severe distress in global financial markets. The failure of Lehman Brothers in September 2008 sparked broad uncertainty about the stability of the global financial system and the ability of banks to access new funding. Australian ADIs' access to global long-term wholesale markets was curtailed and what funding occurred was at spreads that were significantly wider than normal. Deposit markets were also unsettled with some ADIs experiencing deposit outflows in October 2008.

Governments in a number of other countries introduced guarantee schemes to support funding of their financial systems, led by the Irish Government in September 2008. Other governments had little option but to follow as, in the uncertain environment, it was untenable for unguaranteed banks to compete for funding against their guaranteed peers. On 12 October 2008, the Australian Government announced increased depositor protection and guarantee arrangements for ADI funding. Details of the scheme were announced on 24 October 2008 following advice from the Council of Financial Regulators (CFR), and the scheme became operational on 28 November 2008, under the administration of the Reserve Bank. Depositor protection arrangements were strengthened through the introduction of the Financial Claims Scheme, to initially cover deposits of $1 million or below.

By guaranteeing certain liabilities, the Australian Government looked to bolster confidence in ADIs and ensure that an otherwise sound ADI would not experience financial distress due to a shortage of funding. The aim was to promote the stability of the Australian financial system and an ongoing supply of credit to the economy, while ensuring that Australian institutions were not placed at a disadvantage to their international peers that could access similar government guarantees.

Design Features

The Guarantee Scheme enabled eligible ADIs to access a government guarantee for large deposits and wholesale liabilities. In exchange for the guarantee, which bestowed the government's AAA rating on this debt, ADIs paid a monthly fee based on their credit rating and the value of the debt/deposits guaranteed.

* The authors are from Financial Stability Department.

The scheme shared many features with wholesale debt guarantee arrangements announced in other countries although, on balance, it was more flexible and generally at the more supportive end of the international range (Schwartz 2010). This was by design: the emphasis was on supporting financial stability by seeking to deliver arrangements that decisively addressed potential investor concerns without the need for subsequent further interventions. Specifically:

- **Size of the scheme:** the government did not limit the total value of liabilities covered, in contrast to most other schemes. Countries that imposed limits tended to apportion them based on the outstanding debts of an institution or some proportion of their size (BIS 2009).
- **Term of the guaranteed debt:** the Australian scheme covered issuance at different maturities up to a maximum of five years (less for foreign bank branches).[1] ADIs could issue debt up to this maximum at any point while the scheme remained open to new issuance. In comparison, many other schemes nominated a maximum maturity date – often three years – beyond which debt would not be guaranteed. It was later extended in some cases.
- **Closure date:** no closure date was announced when the scheme was introduced, rather it was declared open 'until conditions normalise'. Most other governments set a closure date when announcing their schemes, with many subsequently extending these dates.
- **Fees:** for highly rated borrowers (AA- and above), the fee charged under the Australian scheme was ultimately relatively low compared with those in other countries.[2] The difference in fees between highly rated and lower-rated borrowers in Australia was, in contrast, high by international comparison (Table 1).[3] Monthly fees were charged on the balance of outstanding guaranteed liabilities, which was in contrast to many other countries where fees were charged up front for the life of the security/scheme and were non-refundable.

Table 1: Government Long-term Wholesale Debt Guarantee Pricing[(a)]
Basis points per annum

Country	Minimum fee AA- rated or better	Maximum fee	Range
Australia	70	150	80
Netherlands	73	113	40
Sweden	74	95	21
Spain	87	105	18
New Zealand[(b)]	90	200	110
Denmark	95	95	0
United Kingdom[(c)]	99	125	26
South Korea	100	100	0
Canada	110	135	25
United States	125	125	0

(a) Final fee schedule
(b) NZ$ fee (subtract 20 basis points for foreign currency fee)
(c) RBA estimates based on credit default swap premiums
Sources: BIS; Bloomberg; RBA; Treasury departments, central banks, debt management offices and guarantee administrators

1 Foreign branches were treated differently because, unlike foreign bank subsidiaries, they are not separate legal entities with their own regulatory capital held in Australia. Initially they were given a fixed maturity limit of 31 December 2009, subsequently changed to a rolling 15-month maturity limit.

2 The level of fees was comparable to the initial fee under the US guarantee arrangements, but the US authorities subsequently raised the fee.

3 See Schwartz (2010).

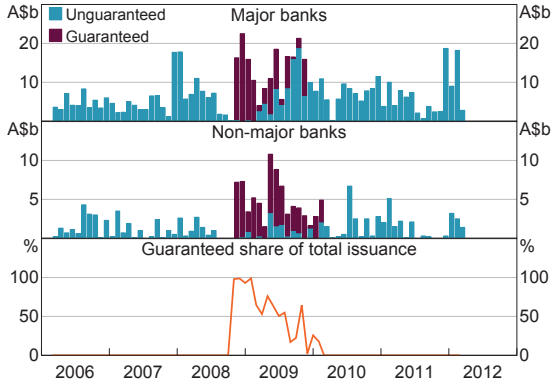
Use of the Guarantee Scheme

Late 2008 to early 2010: Scheme open to new liabilities

The Guarantee Scheme had immediate impact. After a short period of virtually no long-term debt issuance, ADIs issued large volumes of guaranteed debt as soon as the scheme became operational in late 2008. In the three months before its introduction, ADIs issued bonds worth $2 billion, while in the first three months of the scheme they issued $73 billion of bonds ($70 billion of which was guaranteed) (Graph 1). This initial period, when risk aversion among investors was highest, marked the peak use of the scheme. Thereafter, the guaranteed bonds' share of total bond issuance fell from 100 per cent in late 2008 to around 30 per cent in late 2009, with the fee structure providing an incentive for ADIs to return to unguaranteed forms of funding as markets normalised. Initially, ADIs used the scheme to issue at slightly longer maturities than for unguaranteed liabilities (Graph 2).

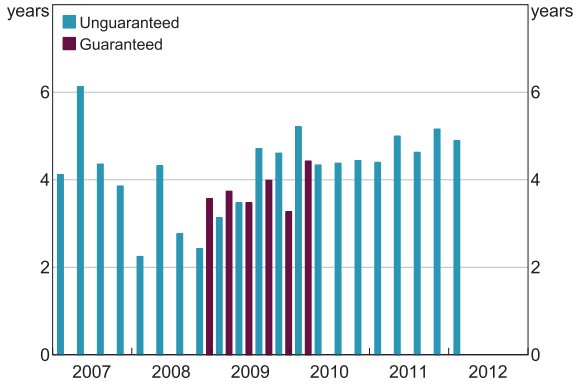
At its largest, the scheme covered $170 billion of liabilities, equivalent to 7½ per cent of total ADI liabilities. The scheme was mainly used for new long-term wholesale liabilities (Graph 3) as ADIs sought to lengthen the maturity structure of their liabilities. The guarantee of large deposits and short-term wholesale debt was less prevalent, though the availability of the guarantee for the range of instruments offered funding flexibility for ADIs with different funding compositions. For example, smaller institutions generally have a higher share of deposit funding. Indeed, non-major ADIs accounted for a relatively large share of guaranteed large deposits in the early months of the scheme. Non-major ADIs, including foreign-owned subsidiaries and branches, accounted for a large share of short-term debt issuance over the life of the scheme, partly reflecting the fact that foreign-owned bank branches were not permitted to issue guaranteed debt with a tenor greater than 15 months.

Graph 1
Australian Banks' Bond Issuance
A$ equivalent, monthly



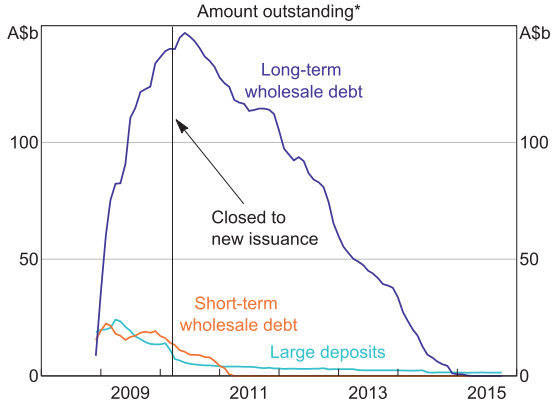
Source: RBA

Graph 2
Tenor of ADI Bonds
At issuance, quarterly



Source: RBA

Graph 3
Guarantee Scheme Usage
Amount outstanding*



* Average daily values guaranteed each month
Source: Government Guarantee Administrator

The main users of the scheme in absolute terms were the four major Australian banks, though issuance as a share of liabilities was higher among non-major Australian banks (Table 2). This was driven by the behaviour of some of the larger non-major Australian banks, where guaranteed long-term bond issuance accounted for over 10 per cent of their liabilities. Prior to the crisis, non-major banks had issued comparatively small amounts of bonds, making greater use of residential mortgage-backed securities markets. However, with the adverse events of the crisis and consequent investor aversion to securitisation markets, these banks issued large amounts of guaranteed bonds in late 2008 and into 2009.

The government closed the scheme to new issuance from the end of March 2010, following advice from the CFR that funding conditions had 'normalised'. The CFR had noted that the scheme was no longer primarily being used to address problems of market access and that similar schemes in many other countries had closed or were soon to close. By the time the scheme closed to new issuance, Australian banks had significantly shifted their funding practices to structures considered more stable, boosting deposit and long-term funding while reducing use of short-term wholesale funding.[4] Such moves were consistent with international efforts to strengthen financial system resilience by regulators and institutions in the wake of the global financial crisis.[5]

Early 2010 to late 2015: Movements in existing guaranteed liabilities

Following the closure of the Guarantee Scheme to new issuance, the stock of guaranteed bonds began to fall around mid 2010 as previously issued guaranteed bonds matured.[6] By the start of 2011, changes in the stock of total guaranteed debt were almost wholly determined by changes in guaranteed long-term debt, as the amounts of short-term debt and large deposits guaranteed were much smaller and had already fallen from their peaks. In addition to the downward effect of maturities on the outstanding stock, institutions began buying back their government-guaranteed debt as market conditions improved (Graph 4).[7] Around the start of 2011, the all-in cost of guaranteed debt – including the government fee – had become more expensive than issuing new unguaranteed debt (Graph 5). As the maturity profile of the guaranteed debt shortened, it became increasingly attractive for the major ADIs to buy back guaranteed bonds with between 12 and 18 months remaining to maturity.

Major ADIs accounted for just over half of total buybacks in absolute terms, but non-major ADIs bought back considerably more guaranteed debt as a share of guaranteed debt issued. Non-major ADIs bought back around $25 billion of guaranteed debt, or just over 50 per cent of their guaranteed issuance, while major banks bought back $33 billion, equal to about 33 per cent of their issuance. This ability to buy back guaranteed debt allowed for a faster return to standalone market-based funding and reduction in government contingent liabilities than would otherwise have been the case.

The bulk of buyback activity for guaranteed debt occurred between late 2012 and mid 2013. After that, changes in the stock of guaranteed debt were largely driven by the maturity of long-term wholesale debt. The final guaranteed bond matured in early 2015, though the guarantee extended until 24 October 2015 over the residual value of at-call large deposits – around $1.4 billion. The continuation of the guarantee seven months beyond the length at which the final guaranteed bond matured reflected a decision made in its initial design to allow time in the event that investors needed to make a claim after maturity.[8]

4 For further discussion of this change, see Deans and Stewart (2012).

5 For further discussion of improvements to ADIs' liquidity management, see RBA (2015).

6 The value of the stock of outstanding guaranteed bonds also fell with the appreciation of the Australian dollar, given that many bonds had been issued in foreign currencies (mostly US dollars).

7 Though the first buyback of guaranteed debt occurred early in mid 2009, buyback activity was not prominent until 2011.

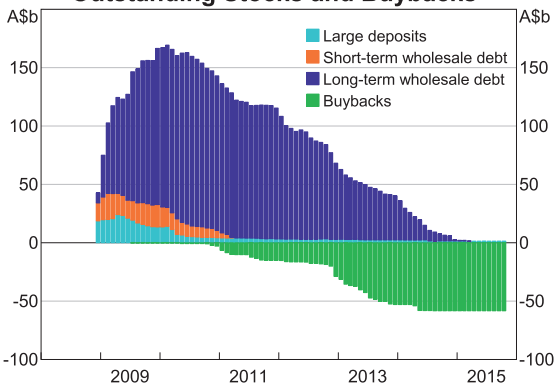
8 For further discussion, see RBA (2013).

Table 2: Bank-issued Government-Guaranteed Debt
March 2010

	Outstanding long-term bond issuance	Share of total liabilities	Memo item: Guaranteed wholesale liabilities as a share of wholesale liabilities
	A$ billion	Per cent	Per cent
Major banks	94.9	4.1	14.2
Non-major banks	45.2	8.3	18.1
Australian-owned	32.1	11.7	42.2
Foreign-owned	13.1	4.8	10.3
Total	140.1	4.9	15.5

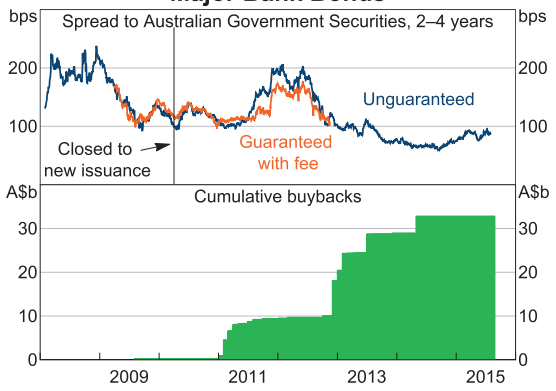
Sources: Government Guarantee Administrator; RBA

Graph 4
Guarantee Scheme
Outstanding Stocks and Buybacks*



* Average daily values guaranteed each month
Source: Government Guarantee Administrator

Graph 5
Major Bank Bonds



Sources: Government Guarantee Administrator; RBA; UBS AG Australia Branch

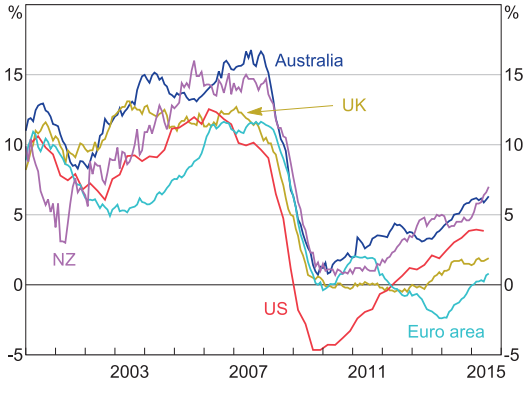
Assessing the Guarantee Scheme

There are strong grounds to conclude that the Guarantee Scheme was successful. It achieved its objective of helping to stabilise the financial system and promote the flow of credit to the economy, while ensuring that Australian institutions were not placed at a disadvantage to their international peers that could access similar government guarantees. While there were many factors supporting the resilience of the Australian economy and financial system during this period relative to those in other countries, the heavy use of the scheme shows that it played an important role in bolstering funding for the financial sector, thereby supporting credit provision to the economy (Graph 6).[9] In doing so the Guarantee Scheme incurred no losses, suggesting that the settings were appropriate for the circumstances. For the support provided to ADIs, the scheme earned the government fees of $4½ billion.

The scheme's intervention in markets was relatively contained to the period where it was required. It was introduced soon after international conditions and the actions of international authorities necessitated it, and it was closed to new issuance when other international schemes had started to close and market conditions were judged to have

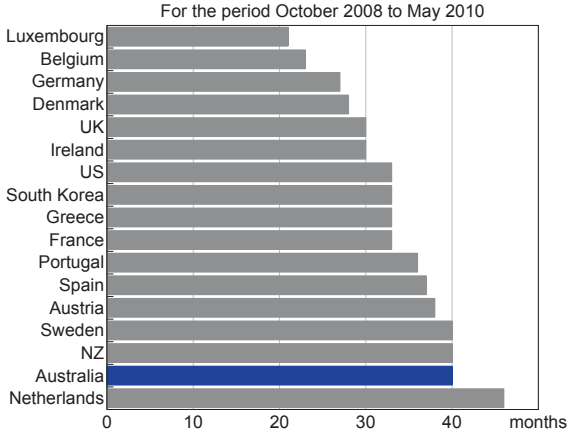
9 See Davis (2011) for a study of Australia's financial system during the crisis.

Graph 6
Private Sector Credit Growth
Year-ended



Sources: Bank of England; European Central Bank; RBA; Thomson Reuters

Graph 7
Average Maturity at Issuance
For the period October 2008 to May 2010



Source: Levy and Schich (2010)

normalised. The judgement-based closure of the scheme, as opposed to using a pre-announced closure date (as in a number of other countries), avoided potential market uncertainty over whether arrangements would be extended in the lead-up to the pre-announced closure dates; in contrast, there were multiple extensions of arrangements in a number of other countries.

The pricing structure and fee payment arrangements also supported the 'natural exit' of the guarantee arrangements when market conditions normalised. In addition to the pricing incentive on new issuance, the pricing structure and fee payment arrangements encouraged and facilitated ADIs buying back guaranteed debt, thereby hastening the reduction in the stock of government-guaranteed debt and the government's contingent liability. The buyback feature of the scheme appears unique among countries with a guarantee. The monthly fee payment, as opposed to an upfront fee, also had the benefit of not draining additional funds from ADIs at a time when pressures on their liquidity were most acute.

A number of features of the scheme compared favourably with other schemes internationally in being relatively supportive of financial stability at the margin. For example, the relatively long maximum maturities allowed ADIs more flexibility to lengthen maturities (Graph 7) and avoid bunching of refinancing risk. The lower fee structure overall was relatively supportive of ADI funding and therefore credit provision.

In doing so, the scheme generated a level of contingent liabilities for the government which, on a number of metrics, was large by the standards of international schemes (Table 3). It is important to note, though, that the size of contingent guarantees over banking system bonds is only a partial indication of governments' exposure to banking systems. Governments in other countries incurred liabilities from various other channels, including direct liabilities from asset purchases and capital injections that sometimes generated losses.

The size of the scheme relative to those in other countries partly reflects some important structural and cyclical differences. The funding structure of Australian banks has a higher weight on wholesale funds than many other banking systems. When the scheme was enacted there was only modest government support for alternative funding sources such as residential mortgage-backed securities markets and covered bonds were not available. Also, credit growth in Australia remained relatively resilient compared with that in other countries. Australia is reported to be one of only a handful of countries where banking institutions recorded net issuance of bonds between October 2008 and May 2010: over the life of the scheme, ADIs issued around 50 per cent more by value of guaranteed bonds than expired from unguaranteed bonds.[10]

10 As reported in Levy and Schich (2010). The other countries were Austria and Denmark.

Table 3: Guaranteed Bond Issuance
October 2008 to May 2010

	Total issuance	Per cent of 2010 country banking system assets	Per cent of 2010 country public sector revenue
	US$ billion		
Australia	145	6.0	54
Denmark	43	5.7	34
Ireland	81	5.2	120
New Zealand	8	2.8	16
Sweden	24	2.5	16
United States	328	2.5	14
Germany	243	2.2	26
Austria	26	2.0	19
United Kingdom	195	1.8	24
France	169	1.8	15
Netherlands	62	1.7	19
Greece	11	1.7	10
Spain	53	1.3	15
Portugal	6	0.8	7
Belgium	5	0.4	3
Luxembourg	1	0.1	4
South Korea	1	0.1	1

Sources: Helgi Library; Levy and Schich (2010); RBA; World Bank

Despite the large contingent liability, no claims were made against the scheme. Consideration was given to risk in the design of the scheme and monitoring of its use. In a global systemic crisis it was judged preferable to err on the side of supporting the financial system with simple, easy to understand arrangements, than to impose greater control over exposures through features such as limits or institution-specific pricing. This also reflected the assessment that the Australian banking system entered the crisis in sound condition.

There were also a number of safeguards in the scheme and its operation. The rules specified that institutions seeking involvement required Australian Prudential Regulation Authority approval.[11] Foreign branches, which are subject to less Australian supervisory oversight, had a number of restrictions, such as shorter maturities; total guaranteed liabilities could not exceed 110 per cent of the average daily value of short-term liabilities and deposits in the 30 days prior to the announcement of the scheme; and their guaranteed liabilities could not be used to directly support the foreign branch outside Australia or the obligations of its parent or any related entity. There was close monitoring of exposures and regular reports to the CFR on aspects such as individual bank exposures and foreign branch activities.

Conclusion

The Guarantee Scheme was a significant government intervention taken in late 2008 in response to similar actions by authorities abroad during the global financial crisis. It was closed to new liabilities from the March quarter in 2010, and

11 See Australian Government (2012) for full scheme rules.

the amount guaranteed progressively wound down until the guarantee over the low level of remaining liabilities expired in late 2015. By ensuring continued access to funding markets, the scheme successfully supported the Australian financial system and economy through the period of extreme pressure on banking systems globally. Design features of the scheme helped to contain its use to the period when it was needed most: as market conditions normalised, the fee structure discouraged issuance of guaranteed debt and encouraged ADIs to buy back guaranteed debt. The scheme incurred no losses, suggesting that the settings were appropriate for the circumstances, and earned fees of $4½ billion from ADIs for the support provided.

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The Rise in Dividend Payments

Michelle Bergmann*

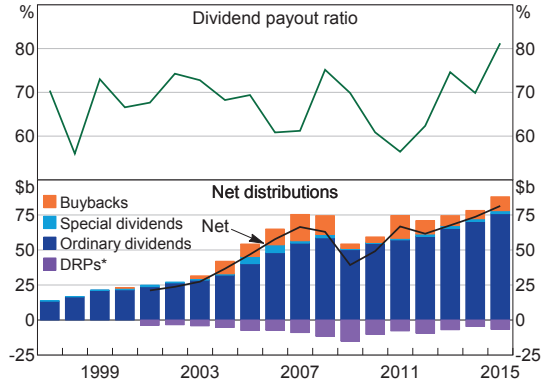
Dividends paid by Australian listed companies have grown substantially since the global financial crisis, most notably among large resources companies and the banks. These increases have occurred alongside modest growth in earnings. Dividend-paying companies appear to generally smooth these payments, having been reluctant to reduce their dividend payments in particular. The increase in dividends over recent years could reflect an increase in shareholder preferences to receive income payments or a perception among company managers that there are fewer viable investment opportunities; the data offer some modest support to both of these hypotheses.

Introduction

Dividends are cash payments that companies make to their shareholders. They represent a company's choice to return earnings to shareholders, instead of being used for other alternatives, including retaining earnings to fund investments internally or to strengthen its balance sheet or liquidity position. In 2015, Australian-domiciled listed companies announced that they would pay $78 billion in dividends (Graph 1). These payments represented 81 per cent of these companies' underlying earnings for the same period (the 'payout ratio') and 4.8 per cent of the market capitalisation of these companies as at end June 2015 (the 'dividend yield').

Australian companies' dividends are high by international standards (Table 1). This in part reflects the effect of tax policies, particularly Australia's system of dividend imputation, which was introduced in July 1987. Previously, Australia had a dual taxation regime under which earnings were taxed at both the company rate and at the applicable personal income tax rate for each receiving shareholder. Dividend imputation ensures

Graph 1
Shareholder Distributions
All listed companies, financial years



* Data on capital raisings through dividend reinvestment plans (DRPs) available from 2001 onwards

Sources: ASX; Morningstar; RBA

Table 1: International Dividend Payout Ratios
Average over 2005 to 2015

Australia	67
United Kingdom	60
Japan	57
Europe	55
Canada	52
United States	48

Sources: Bloomberg; Morningstar; RBA

* The author is from Domestic Markets Department.

that company profits paid to Australian residents as dividends are only taxed once.[1]

Dividend payments increased strongly between the 2010 and 2015 financial years, rising by roughly 40 per cent. 'Ordinary' dividends are a regular distribution of earnings to the shareholder, but companies can also make cash distributions to shareholders via one-off 'special' dividends or share buybacks. On the other hand, dividend reinvestment plans (DRPs) offer the opportunity for shareholders to return the funds to the company as an increased equity holding. The increase in net cash distributions has been driven by a rise in ordinary dividends rather than special dividends, which suggests that companies intended for this to be a more permanent increase in dividend payments.

Consistent with the increase in dividend payments, the dividend payout ratio has also risen and, in 2015, reached its highest level in more than a decade. This increase in dividends has occurred in an environment of relatively modest growth in earnings and over a period in which many companies have sought to reduce leverage. These developments have raised questions about the sustainability of dividend payments and the extent to which companies' dividend policies have committed them to a particular dividend payment level. In February this year, a number of companies announced reductions to their interim or final dividend payments and changes to their dividend policies, potentially reflecting concerns related to sustainability. Even so, the dividend payout ratio increased further. Shareholders may have also demanded higher dividends over recent years amid lower yields on traditional cash-paying bond-like investments and increased risk aversion. These developments have also highlighted the choices companies face between the potentially competing objectives of paying dividends, reducing balance sheet leverage and investing in productive capital.

Theories of Dividend Policy

A range of theories have been advanced to explain corporate dividend payments, though there is no agreement about how companies should make these choices.

Modigliani and Miller's (1961) theory of dividend irrelevance suggests that shareholders should be indifferent to being paid a dividend or not, given that in the latter case, higher retained earnings should be reflected in a higher share price. This is because dividends can be reinvested in shares, or alternatively some shares can be sold in exchange for cash, depending on the preferences of the shareholder. While this is a useful starting point for understanding dividend theory, a bias towards paying dividends emerges if transaction costs and differing tax treatments for capital gains and dividends exist, as they do in the Australian market.

Company boards may also be influenced by their shareholders' preferences for dividends, often referred to as the 'clientele effect' (Baker and Wurgler 2004). Shareholders' preferences may: be influenced by tax incentives, as mentioned above; differ by investor type, with retail investors thought to favour dividends over capital gains more than wholesale investors; and vary cyclically, with dividends providing an income stream in a lower growth environment and posing less of an opportunity cost in terms of the company's investment opportunities.

Furthermore, dividend payments are expected to vary over the firm's life cycle (Mueller 1972). 'Growth' stocks (such as junior exploration companies, IT start-ups or biotechnology firms) often initially have large investment expenditures relative to their earnings, have limited access to finance, and therefore typically pay fewer dividends. More mature firms, on the other hand, are generally more able to pay dividends given their access to more

1 The system of dividend imputation allows companies to attach franking credits to the dividend, which are drawn from a franking credit balance based on past company taxes paid by the company. Shareholders pay tax on the franked component of a dividend if their marginal income tax rate is above the company tax rate, or alternatively receive a tax refund if their marginal tax rate is below the company tax rate.

stable sources of funding and income. For more mature firms, dividend payments may also be seen as a signal of a positive outlook (Miller and Rock 1985). This can lead to firms placing some emphasis on smoothing dividends through time, as well as a reluctance to cut dividends when earnings fall.

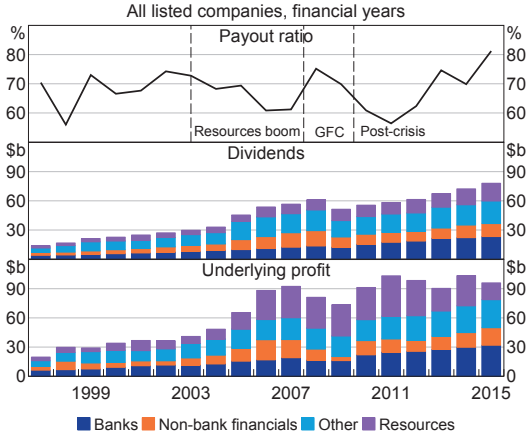
Notwithstanding these theoretical considerations, it is not always clear how company boards decide on a particular dividend payment amount. A commonly cited survey of US company executives by Brav *et al* (2005) found that executives tended to first aim to maintain the level of dividends paid before making investment decisions and only later decide whether to increase dividends with any remaining cash. Buybacks were a favoured method to distribute residual cash and to retain flexibility over future distributions.

It is not clear whether Australian executives have followed similar decision-making processes, although public statements by some of the largest Australian listed companies regarding their dividend policies are not inconsistent with the conclusions of the Brav *et al* (2005) survey. Table 2 presents a summary of statements referring to dividend policies from the public documents of selected ASX 20 companies. Among the larger, well-known Australian companies, payout ratios are the most common policy mentioned, though there have also been other considerations. Progressive dividend policies (maintaining or increasing the dollar value of the dividend payment per share) or a preference for increasing dividends have been fairly common, consistent with a preference not to cut ordinary dividends.

Aggregate Trends

Since 2003, the aggregate dividend payout ratio has evolved in three broad phases: first, falling as dividends grew less strongly than earnings during the early high-investment stage of the resources boom; second, rising temporarily during the global financial crisis, as dividends fell but by less than earnings; and more recently, rising quickly alongside large increases in dividends while earnings have been, in aggregate, relatively flat (Graph 2). Notwithstanding the fact that many companies may target a particular payout ratio, in aggregate, payout ratios have increased significantly in recent years.

Graph 2
Dividends and Profits
All listed companies, financial years



Sources: Morningstar; RBA

Comparing dividend payments to operating cash flows may more directly measure the ability of companies to pay announced dividends out of current period cash profits. If capital expenditure and dividends together exceed operating cash flow, a company will need to raise debt or equity or draw down on existing cash holdings to finance these expenditures. Such shortfalls may be interpreted as a firm paying out 'excessive' dividends, particularly if the shortfalls persist. Conversely, a dividend payment may be regarded by investors as 'too small' if the firm is accumulating cash without allocating it to a suitable investment opportunity. However, as mentioned above, dividend decisions may also be governed by other considerations, such as decisions the companies may make in relation to desired gearing levels, liquidity, future investment and, potentially, their commitment to an established dividend policy alongside a desire to meet shareholder expectations.

The ratio of dividend payments to operating cash flows has risen in recent years to be above

Table 2: Public Statements of Dividend Policies of Selected ASX 20 Companies

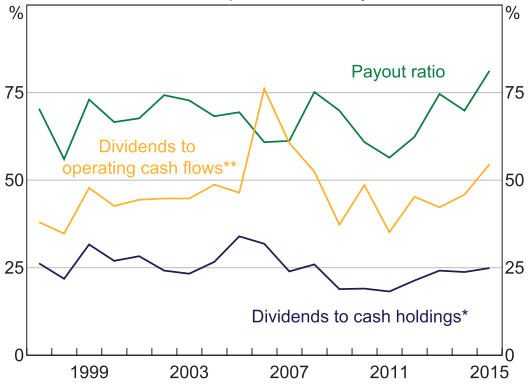
Company	Dividend policy
AMP	A **payout ratio** of 70 to 90 per cent of underlying profit
BHP Billiton	A **minimum payout ratio** of 50 per cent, introduced in 2016. This replaces a long-standing **progressive dividend policy** that aimed to steadily increase or at least maintain the dividend per share in US dollar terms at each financial half year
Brambles	A **progressive dividend policy**, which seeks to maintain or increase dividends per share each year, in Australian cents, subject to its financial performance and cash requirements
Commonwealth Bank of Australia	A full-year **payout ratio** of 70 to 80 per cent
Insurance Australia Group	A full-year **payout ratio** of 60 to 80 per cent of cash earnings
Macquarie Group	A full-year ordinary dividend **payout ratio** of 60 to 80 per cent
National Australia Bank	A **payout ratio** of 70 to 75 per cent of cash earnings
QBE Insurance Group	A **maximum payout ratio** of annual cash profits of 65 per cent
Rio Tinto	Shifting to a **payout ratio** in the range of 40 to 60 per cent of underlying earnings through the cycle.[a] This replaces a long-standing **progressive dividend policy** that aimed to maintain or increase the US dollar value of ordinary dividends per share
Suncorp Group	An ordinary dividend **payout ratio** target of 60 to 80 per cent of cash earnings
Telstra Corporation	Within a broader capital management framework, to **increase the dividend over time**
Westpac Banking Corporation	Seeks to **consistently lift ordinary dividends** in terms of cents per share each half while maintaining a strong capital position to support growth
Wesfarmers	Seeks to deliver **growing dividends over time**, with dividends declared reflective of the Group's current and projected cash position, profit generation and available franking credits
Westfield Corporation	An **annual distribution target** is set at the beginning of each year with regard to the prior year's distribution, forecast changes in funds from operations, capital expenditure plans as well as other general business and financial considerations
Woodside Petroleum	A **payout ratio** target of 80 per cent of underlying profit
Woolworths	A full-year **payout ratio** of 70 per cent of after-tax profit

(a) Rio Tinto's new policy targets total cash distributions, i.e. it may be broader than targeting ordinary dividends
Source: Company reports and websites

50 per cent, which is high by recent standards outside of the global financial crisis (Graph 3). Companies receive cash inflows from (net) operating income and financing activities (e.g. debt and equity raisings), while cash outflows are directed to investing activities and paying dividends. Throughout most of the period since the early 2000s, Australian companies were accumulating cash (that is, the 'stock' of cash holdings was increasing), most notably in the resources sector, which was benefiting from strong income during the resources boom (Graph 4). However, in the most recent year, net cash flows have turned negative. While not sustainable over an extended period of time, a negative cash flow in any one period could be motivated by

a range of considerations, as mentioned above. Dividends relative to accumulated cash holdings on companies' balance sheets are not particularly high, at around historical averages. The following discussion examines behaviour by sector and company size for insights into recent dividend payment activity.

Graph 3
Dividend Ratios
All listed companies, financial years

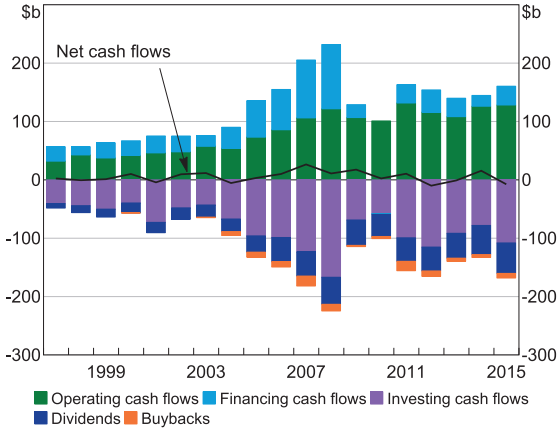


* Excluding banks; cash holdings are the outstanding cash balances held on company balance sheets (a stock concept) while operating cash flow is one source of cash inflow

** Operating cash flow is often larger than profit as it excludes non-cash charges such as depreciation

Sources: Morningstar; RBA

Graph 4
Sources and Uses of Cash Flows
All listed companies excluding banks, financial years

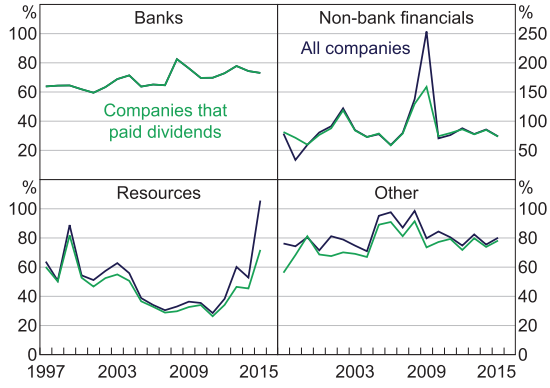


Sources: Morningstar; RBA

Sectoral Trends

Since 2010, dividend payout ratios have increased in the resources and banking sectors, while they have generally displayed no trend in the other sectors (Graph 5). For companies paying dividends, the payout ratios do not appear to be unusually high relative to history. Sizeable losses among resources companies (that aren't currently paying dividends) explain why the payout ratio is currently above 100 per cent when all listed companies in the resources sector are considered.

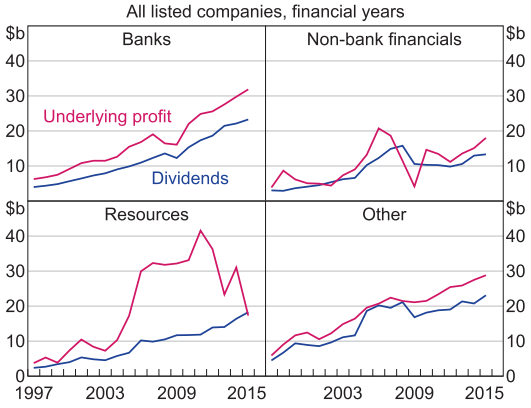
Graph 5
Sector Payout Ratios
All listed companies, financial years



Sources: Morningstar; RBA

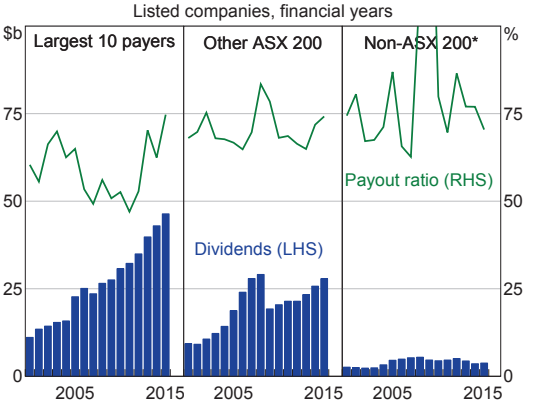
The large swings in the payout ratio of the resources sector over the past decade have had a significant influence on aggregate trends. These swings correspond roughly with the payout ratio falling during the investment phase of the resources boom, and rising as the resources boom shifted into the production phase. The fall in the payout ratio during the investment phase occurred alongside a sharp rise in profits in the sector and is consistent with resources companies largely using retained earnings rather than other sources of funding to finance the corresponding resources investment boom over this period (Arsov, Shanahan and Williams 2013) (Graph 6). However, payout ratios have risen sharply in recent years, albeit from a low level, as the transition to the production

Graph 6
Dividends and Profits
All listed companies, financial years



Sources: Morningstar; RBA

Graph 7
Dividend Distributions
Listed companies, financial years



* Aggregate payout ratio for all companies that paid dividends; non-ASX 200 companies' payout ratios reached 165 per cent in 2009

Sources: Morningstar; RBA

phase has coincided with a decline in earnings alongside lower commodity prices and some major companies in this sector maintaining, until recently, progressive dividend policies.

The payout ratio in the banking sector has been on an upward trend over the past decade to be just below 75 per cent in aggregate. In all sectors outside of resources, payout ratios spiked higher during the global financial crisis, as companies smoothed payments to shareholders, reducing dividends but by less than the decline in earnings. This occurred most dramatically in the non-bank financial sector, where the fall in earnings was particularly marked. The payout ratio for dividend-paying companies in the 'other' sector has increased modestly relative to pre-crisis levels.

Dividends are also usually concentrated among the largest companies, and this is borne out in the Australian data. The increase in dividend distributions over the past decade has been entirely driven by the ASX 200 companies, and particularly by the largest dividend payers (Graph 7). The 10 largest dividend payers vary over time, but usually include the major banks, the major diversified miners, Telstra Corporation and the major supermarkets. The distributions of the largest payers account for more than half of total dividend payments. However, in aggregate, the top 10 dividend payers are expected to reduce dividend payments in 2015/16 for the first time since the global financial crisis, with the major miners having announced a shift away from progressive dividend policies. Total dividends paid by the remainder of ASX 200 companies remains below its peak in 2007, while the majority of listed companies outside of the ASX 200 do not pay dividends.

The concentration of dividend payments among the largest companies highlights the importance of their decisions for the overall payout ratio for the ASX 200. Not surprisingly, these companies are also mainly the traditional blue chip stocks favoured by Australian retail investors. This may reflect a preference by these investors towards well-known companies, but it is also consistent with the suggestion that retail investors may have a preference for dividend-paying stocks.

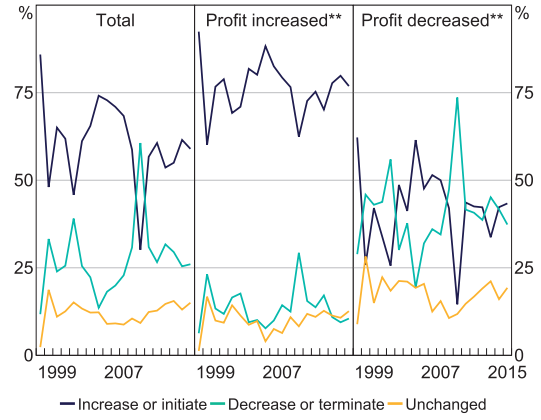
The Commitment to Paying Dividends

The theory and sectoral evidence are consistent with dividends being typically more stable than earnings. Companies may be reluctant to reduce dividend payments in dollar terms, even though many companies express their dividend policy in terms of a target payout ratio. Other companies have policies that suggest a commitment to a dollar

amount; however, some large resources companies have recently shifted away from such policies, adopting instead policies that are linked to payout ratios, but with some flexibility to deviate based on managerial discretion.

Firm-level data, covering around 400 to 500 dividend-paying companies for each year, confirm that in general a majority increase the dollar value of dividend payments each period (Graph 8). Earnings do have some influence on dividend decisions. Around three-quarters of dividend-paying companies increase their dividend payments in periods where earnings have increased.[2] In contrast, when earnings fall (not including when a loss was recorded), a majority of companies still seek to increase dividends or keep them unchanged from the previous period. This apparent reluctance to cut dividends may support dividends in an environment of weaker profit growth and appears to be a factor in the increase in payout ratios in the past year. Notwithstanding this, most companies have usually been willing to reduce dividend payments in periods when they record a loss.

Graph 8
Dividend Payment Changes
Proportion of all listed companies that paid dividends, financial years*



* Including companies that paid dividends in the current or previous year
** Strictly positive profits only, i.e. excluding companies that made a loss
Sources: Morningstar; RBA

2 The global financial crisis stands out as an exception to the above behaviour, with profitable firms more willing to reduce dividends, potentially reflecting the tighter funding conditions at that time.

Companies' potential reluctance to reduce dividends has been evident at times in company statements regarding their commitment to established dividend policies. It is also evident in the major banks paying out around $23 billion in dividends in 2014/15, an increase on the previous year, while also choosing to raise around $23 billion in equity in 2015, including through the use of DRPs.

Shareholder Demands on Dividend Payments

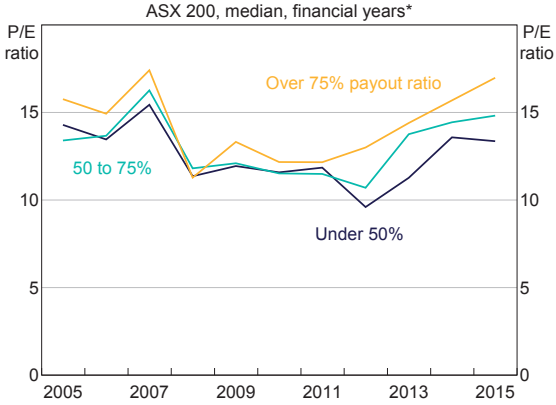
A number of explanations have been suggested for the strong rise in dividend payments by Australian companies over recent years. One potential explanation is an increase in shareholder demand for dividends. If shareholders are now more risk averse, they may have a stronger preference for companies to return cash as dividends rather than retaining it for investment. Shareholders may also prefer to limit their exposure to particular companies, and dividend payments may be cost-effective relative to the option of reducing their stake via selling shares. It may also be that companies have committed to raising dividends as a signal about the ongoing viability of the company.

Investors may have also increased their demand for 'bond-like' equities, in response to interest rates falling to historical lows. That is, in rebalancing their portfolios towards equities, they might favour dividend-paying stocks, particularly among investors with strong preferences for income (for example, retirees) or who can utilise franking credits. The above explanations may be interrelated as a relatively more risk-averse group of investors may have a greater influence in equity markets while having a preference for specific high-dividend-paying equities. The ageing of the population may further reinforce a shift towards risk aversion among equity investors, with preferences for financial risk-taking generally declining with age (Lowe 2014).

Direct evidence for shareholder preferences and demands is generally not available. However, data which are consistent with this explanation

are available for ASX 200 companies – the main dividend payers. An implication of Modigliani and Miller's (1961) theory is that the total returns (share price plus dividends) of investing in shares should not depend on whether the company pays high or low dividends. However, high-dividend-paying equities have outperformed the broader Australian index since 2011 on a total returns basis, which would be consistent with a shift in preferences towards these stocks. High-dividend-paying equities have also tended to have higher valuations, as measured by the forward price-to-earnings (P/E) ratio, and this gap has increased over recent years (Graph 9). This might reflect investors requiring a relatively lower equity risk premium for companies that pay higher dividends. Alternatively, these metrics could indicate that high-dividend-paying companies are also generally companies that have a stronger outlook for earnings.

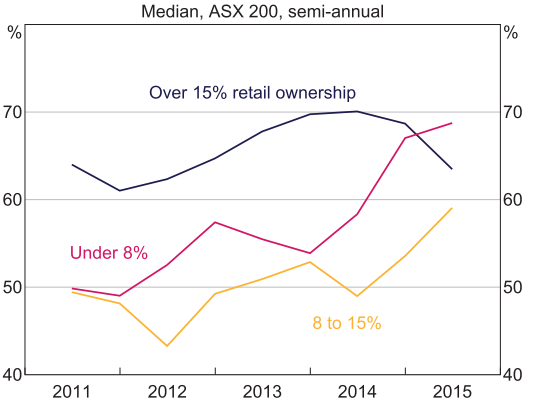
Graph 9
Forward Price-earnings Ratios by Payout Ratio
ASX 200, median, financial years*



* Excludes companies with payout ratios below 0 (companies which did not pay dividends or made a loss)
Sources: Bloomberg; Morningstar; RBA

Companies with a higher retail shareholder base also generally maintain higher payout ratios, although these data are only available from 2011 (Graph 10). The available data are consistent with retail investors generally selecting higher-dividend-paying stocks but do not support the claim that retail shareholder demands have led to higher dividends being paid. Indeed, payout ratios have

Graph 10
Payout Ratio by Retail-oriented Ownership*
Median, ASX 200, semi-annual



* Proportion of shares owned by individuals and super funds domiciled in Australia
Sources: ASX; Morningstar; RBA

trended higher across all companies, not just those with a relatively high retail shareholder base.

Investment Decisions and Dividend Payments

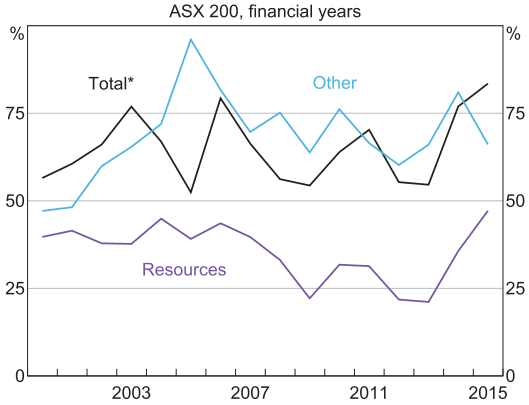
Shareholder pressure to pay dividends and demands to meet high investment hurdle rates have the potential to reduce the available funding for investment projects. The OECD (2015) recently noted that weak business investment globally may reflect increased pressure on companies from activist investors favouring the short-term benefit of shareholder distributions over longer-term investments.

Management teams also may perceive fewer 'viable' investment opportunities. As a result, the firm may return excess funds to investors or face concerns from investors about management's ability to act as their agent. A higher hurdle rate on investment may reflect factors such as a higher equity risk premium demanded by investors, lower assumptions about economic growth and/or a reduced appetite for risk of the firm's management. On the other hand, the decline in the real risk-free bond rate should both lower the firm's cost of capital and returns demanded by investors. However, evidence from RBA liaison suggests that investment hurdle rates

used by corporate boards can be very sticky (Lane and Rosewall 2015).

There is some evidence to support the claim that businesses perceive insufficient investment opportunities and hence have distributed dividends rather than increased cash holdings to fund investment. The weakness in business investment relative to dividend payments is evident in the increase in the ratio of dividends to capital expenditure, particularly for resources companies (Graph 11).

Graph 11
Dividends to Capital Expenditure Ratio
ASX 200, financial years

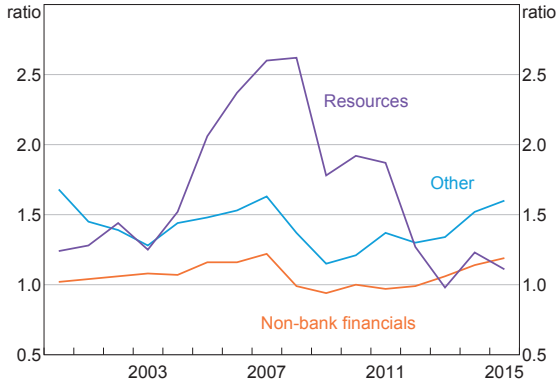


* Including banks and non-bank financials
Sources: Morningstar; RBA

Further, there is little evidence that ASX 200 companies have been constrained with regards to funding, and non-financial companies have held a larger proportion of their assets as cash compared with the pre-crisis period. This accumulation of cash, the relatively low level of company gearing and the availability of external finance at a relatively low cost appear consistent with companies perceiving fewer investment opportunities and/or having a reduced willingness to invest.[3]

While it is difficult to find direct evidence for the direction of the relationship between dividends and physical investment, indirect evidence provides some support for the idea that companies have found fewer 'viable' investment opportunities and therefore returned excess funds as dividends. For example, Tobin's q ratio, a commonly used proxy for investment opportunities, remains below its 2007 peak in aggregate.[4] Not surprisingly, the fall is most marked in the resources sector, which had a large investment boom from the mid 2000s and now faces much more challenging conditions given lower commodity prices (Graph 12).

Graph 12
Median Q Ratio
ASX 200 excluding banks, financial years



Sources: Morningstar; RBA

Conclusion

Growth in dividends over the past few years has primarily been driven by the banks and major miners and has also been associated with an increase in the aggregate payout ratio. This has occurred at a time of slower growth in aggregate earnings and has raised questions about the sustainability of dividend payments, particularly given some apparent reluctance by companies to reduce dividend payments even when profits decline. However, dividend payments are now

3 The book value gearing ratio – the ratio of debt to equity – remains below its average over the past 20 years for non-financial listed corporations.

4 The q ratio is the ratio of the market to book value of a company and measures the market's assessment of the value added by a company through the combination of its assets above the sum of its components. The implication is that the higher the q ratio is above 1, the higher the company's ability is to add value, and the more that new investments may presumably also be valued above the cost of capital. However, the q ratio may just be indicative of share market overvaluation.

expected to fall in 2015/16 for the first time since the financial crisis, given falls in resources sector earnings, and reflecting recent announced changes to dividend policies by the major miners. It is generally difficult to assess the motivations of company decision-makers in paying dividends. The recent growth in dividend payments may have been influenced by shareholder demands, associated with an increase in shareholder risk aversion or an increase in the demand for dividend-paying stocks at a time when traditional income-paying investments (cash and bonds) are offering very low yields. It could also reflect companies perceiving fewer viable investment opportunities and deciding instead to return excess funds to shareholders. The data presented here offer modest support for both of these possibilities.

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The Term Structure of Commodity Risk Premiums and the Role of Hedging

Jonathan Hambur and Nick Stenner*

A standard theory used to explain commodity futures prices decomposes the futures price into the expected spot price at maturity of the futures contract and a risk premium. This article investigates the term structure of commodity risk premiums. We find that risk premiums vary across futures contract maturities, and that the term structure of commodity risk premiums differs between commodities. Furthermore, the risk premiums on crude oil and heating oil have fallen since the mid 2000s, consistent with increased financial investment in these futures markets. This article also outlines evidence to suggest that the existence of a commodity risk premium is related to the hedging activities of market participants.

Introduction

A common theory used to explain commodity futures prices states that the futures price equals the sum of the expected spot price at maturity of the futures contract and a risk premium.[1] Explanations for the existence of a risk premium typically view futures markets as a risk-transfer mechanism between market participants and therefore focus on the role of hedging. For example, commodity producers may want to enter into a short position, which is an agreement to sell a commodity at a specific date in the future at a price agreed when entering the contract. This provides a form of insurance against a decline in the spot price. Commodity consumers may want to enter into a long position to insure against increases in the spot price, and thereby agree to purchase a commodity at a future date. If the hedging activity of producers for a particular commodity is greater than that of consumers, there will be an excess of commercial market participants looking to enter a short position (a 'net short hedging position'). In this case, the *net hedging pressure theory* implies that the futures price will be set below the *expected* future spot price to induce speculators – who do not have a commercial exposure they need to hedge – to balance the market by taking the opposing long position (Cootner 1960). In contrast, if the hedging activity of consumers for a particular commodity outweighs that of producers, there would be a net long hedging position. In this instance, the futures price would be set above the expected future spot price, so speculators would be compensated (through a positive expected return) for taking a short position in the commodity.

Therefore, 'commodity risk premiums' can be defined as returns that speculators expect to receive as compensation for taking another party's natural exposure to fluctuations in commodity prices through buying or selling a commodity futures contract. For example, suppose the spot price of oil is $50 per barrel today, and the market expects the spot price to be $60 in one year's time. If the futures price is equal to $57, then the risk premium speculators expect to receive for balancing the market and assuming the future spot price risk is $3. The rise of

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1 An alternative notion, the theory of storage, argues the difference between the current spot and futures price can be explained by the cost that is incurred to store the commodity, the cost of capital which reflects the opportunity or financing cost associated with buying and holding the physical commodity and an implied convenience yield (Dwyer, Holloway and Wright 2012).

commodity index investing (where investors seek exposure to commodity prices via instruments linked to broad-based commodity indices) since the mid 2000s reflects investors' attempts to earn these risk premiums, as well as speculate on price movements and diversify across various asset classes.

Previous research on the effects of increased commodity futures trading by financial investors has typically focused on the impact on commodity price levels and volatility (see, for example, Dwyer, Gardner and Williams (2011)). Fewer papers have researched how financial investment may affect commodity risk premiums. If, for example, increased financial investment in commodities has 'competed away' the risk premium, then the futures price would, on average, more accurately reflect the expected future spot price. However, even if this were the case, this does not necessarily imply that increased financial investment in commodities has had a distortionary effect on commodity spot prices. Instead, it would suggest there has been a change in the relationship between commodity futures prices and the *expected* future spot price.

Moreover, studies investigating both the existence and determinants of commodity risk premiums have typically focused on risk premiums accruing to positions in relatively short-term commodity futures contracts. Few papers have examined risk premiums accruing to positions in longer-term futures contracts, and/or compared risk premiums for futures contracts on the same commodity but with different maturities (the *term structure* of commodity risk premiums). It is unlikely that risk premiums would be constant along a futures curve. For example, if speculators require a term premium to compensate for price uncertainty over a longer time period, the commodity risk premium may be larger (in absolute terms) for longer-maturity futures contracts. Moreover, the additional information afforded by examining risk premiums on longer-maturity futures contracts may lead to more accurate inferences regarding the determinants of commodity risk premiums.

In considering these issues, this article examines the term structure of commodity risk premiums for a broad sample of commodities, and considers how the term structure has changed over time alongside increased financial investment in commodities since the mid 2000s. It also discusses the net hedging pressure theory as a possible determinant of commodity risk premiums, before moving on to an econometric examination of the relationship between a measure of net hedging pressure and commodity risk premiums for three commodity subsectors: energy, agriculture, and metals. In particular, this article examines whether considering the term structure of commodity risk premiums can provide additional information about the role of net hedging pressure as a determinant of commodity risk premiums.

Commodity Risk Premiums for Individual Commodities

As discussed above, commodity risk premiums can be defined as the difference between the *expected* spot price at some specific future date and the futures price of a contract maturing at that same date. Ideally, commodity risk premiums would be measured *ex ante* using information on market participants' expectations for the spot price of a particular commodity at a specific future date. However, a time series of price expectations across a series of forecast horizons and for a broad range of commodities is not readily available. A commonly used alternative is to measure risk premiums *ex post* by calculating the average annualised futures' excess return, where the excess return is the return from buying a futures contract and settling that contract at expiration. This *ex post* calculation should equal the average *ex ante* commodity risk premium over a long sample under the assumption of unbiased expectations (see Appendix A for more details).

The empirical identification of non-zero commodity risk premiums for individual commodities has been somewhat inconclusive. This is potentially due to relatively high commodity price volatility

relative to average returns, which leads to statistical problems with identifying risk premiums. A lack of reliable long-run data is another potential issue (Rouwenhorst and Tang 2012). However, a number of studies have found evidence of a positive risk premium when analysing returns of commodity indices, as the volatility of individual commodity returns is diversified away when included in an index. For example, Gorton and Rouwenhorst (2006) find evidence of a commodity futures risk premium that is similar in size to the historical risk premium of equities.[2] Notably, empirical identification of commodity risk premiums on individual commodities and commodity indices has typically focused on premiums accruing to positions in relatively short-term futures contracts.

To investigate commodity risk premiums for individual commodities we analyse a sample of 26 commodities over a range of futures contract maturities from 1986 to 2014 (where available).[3] Consistent with most previous studies, we also find that non-zero individual commodity risk premiums on short-dated contracts (e.g. one- to three-month maturities) are hard to identify statistically (Table 1).

Table 1: Average Annualised Excess Returns for Selected Commodities[(a)]
By maturity, per cent

	1-month	3-month	6-month	9-month	12-month
Agriculture					
Coffee	13.4	–4.3	–6.6	–5.7	–7.2*
Corn	–5.4	–4.2	–5.8	–4.5	–3.5
Cotton	–6.4	–2.4	–3.9	–1.6	–1.1
Lean hogs	3.8	–0.5	3.4	3.6	3.7
Live cattle	13.0***	7.2***	5.5***	4.6***	3.7***
Lumber	–11.0	–7.5	–7.2*	–4.7	1.4
Milk	4.0	4.3	2.3	2.8	3.7
Orange juice	9.6	1.5	–2.0	–2.9	–3.7
Soybeans	11.0*	6.2	4.2	4.8*	4.0*
Soybean meal	13.1**	11.2***	9.4***	8.7***	7.7***
Wheat (CBOT)	6.5	–2.6	–3.9	–2.7	–2.5
Wheat (MGEX)	8.8	6.0	2.5	2.3	2.5
Energy					
Crude oil	5.7	6.7	7.4	8.0*	8.4**
Heating oil	9.0	6.8	7.0	7.5*	7.5*
Natural gas	–16.3	–14.6	–9.3	–6.8	–3.9
Metals					
Copper	6.7	5.9	5.3	6.2	6.9*
Palladium	2.8	6.5	9.2*	9.3**	5.0
Platinum	15.5	6.5	5.1	2.7	–0.3

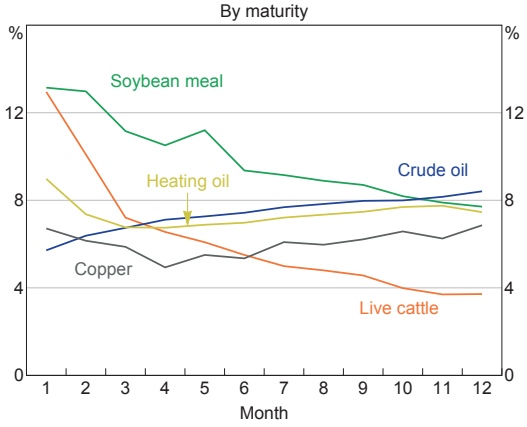
(a) *, **, and *** indicate returns are significantly different from zero at the 10, 5 and 1 per cent level, respectively; sample period 1986-2014; standard errors are robust to serial correlation and heteroscedasticity; CBOT denotes the Chicago Board of Trade; MGEX denotes the Minneapolis Grain Exchange
Sources: Authors' calculations; Pinnacle Data

2 Bhardwaj, Gorton and Rouwenhorst (2015) confirm that this finding holds using more recent data.

3 For more details see Appendix A.

However, in a number of cases we can identify both economically and statistically significant risk premiums on longer-dated futures contracts (e.g. nine- to twelve-month maturities). Further, Graph 1 shows that for a given commodity, the risk premium is typically not constant across futures contracts with different maturities, and the shape of the 'risk premium curve' differs substantially across commodities.

Graph 1
Commodity Risk Premiums*
By maturity



* Average annualised excess returns from buying a futures contract and settling it at expiration; sample period 1986–2014

Sources: Authors' calculations; Pinnacle Data

A positive commodity risk premium can be interpreted as the average return that a speculator would receive by entering a long position in a particular commodity futures contract and holding the contract to expiration. For instance, a strategy that consists of buying a crude oil futures contract with 12 months until expiration and then settling that contract at expiration would, on average over our sample, have received an 8.4 per cent annual return. Alternatively, under the net hedging pressure theory (discussed in more detail below), it can be viewed as the amount by which the futures price is discounted to the expected future spot price, which producers pay as a form of insurance to induce speculators to balance the market. Conversely a *negative* commodity risk premium occurs when consumers have to offer an incentive to induce speculators to enter a *short* position, and the absolute value of the risk premium represents the return the (short) speculator would receive. Therefore a larger absolute risk premium could reflect the fact there is greater net hedging demand for a particular commodity or at a particular maturity, and the slope of the 'commodity risk premium curve' could provide information about how net hedging demand differs at various maturities.

We also observe that the shape of 'commodity risk premium curves' have varied over time for some commodities. Consequently, we investigate below whether the change in market structure associated with the rise in financial investment in commodity futures has affected risk premiums.

The effect of financial investment on commodity risk premiums

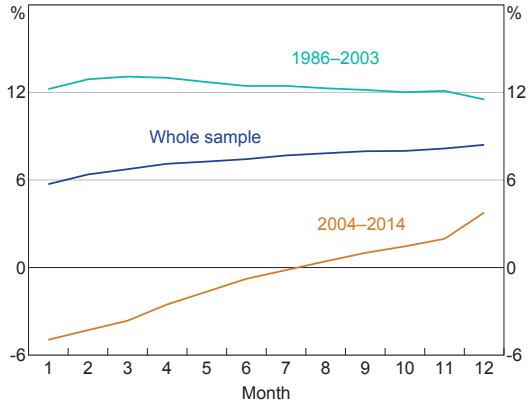
The rise of commodity index investment since the mid 2000s, a key component in the financialisation of commodity markets, may have resulted in smaller absolute risk premiums as investors 'compete away' risk premiums.[4] A key aspect underlying the net hedging pressure theory is that some degree of commodity futures market segmentation from other financial markets acts to limit the number of investors in commodities markets, and prevents the risk premium from being competed away (Cheng and Xiong 2014). If this segmentation was reduced, more investors may enter the market to earn the risk premiums, which should cause the premiums to move towards zero. To the extent that the financialisation of commodities markets represents a decrease in market segmentation, this suggests that financialisation may be associated with smaller absolute risk premiums. Moreover, because much of the increased turnover in futures markets associated with index-fund investing has been through long positions in short-dated futures contracts, it might also be expected that risk premiums on short-maturity futures contracts have declined by more than longer-maturity contracts over time.

4 For an overview of the literature of commodity financialisation, see Cheng and Xiong (2014).

To investigate how financialisation may have affected the term structure of commodity risk premiums, our sample is split into two time periods – 1986–2003 and 2004–14 – to define 'pre-financialisation' and 'financialisation' periods.[5] Using 2004 as a break point is common in the literature and coincides with the beginning of a large increase in the volume of commodity futures trading. Also, to reflect how the degree of financialisation has differed between commodities, we further split our sample into 'on-index' commodities, which are included in both the Bloomberg Commodity Index (BCOM) and S&P GSCI, and 'off-index' commodities for those that are not included in either of these indices.[6]

As expected, we find that for 'off-index' commodities splitting our sample into two time periods does not meaningfully change our results for identifying statistically significant non-zero commodity risk premiums across maturities from one to twelve months. However, for 'on-index' commodities, we identify two cases – crude oil and heating oil – where we find statistically significant positive risk premiums across most maturities over the 'pre-financialisation' period, but we cannot reject the possibility of a zero risk premium over the 'financialisation' time period. Moreover, we also find that the risk premium has declined by a greater magnitude on short-dated contracts (Graph 2 and Graph 3). Crude oil and heating oil are both highly financialised commodities. The results for these commodities are consistent with the rise of commodity index investment partially bidding down risk premiums, and also that this effect has generally been more pronounced at the short end of the futures curve.[7]

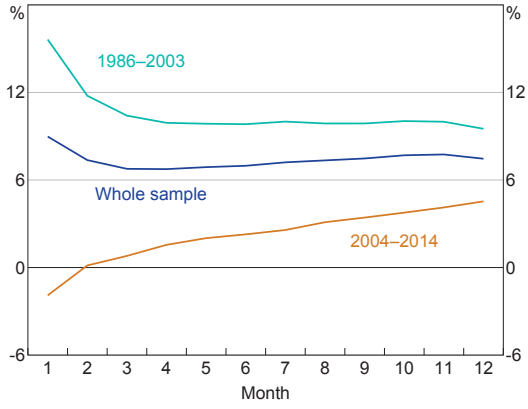
Graph 2
Oil Risk Premium*
By maturity



* Average annualised excess returns from buying a futures contract and settling it at expiration

Sources: Authors' calculations: Pinnacle Data

Graph 3
Heating Oil Risk Premium*
By maturity



* Average annualised excess returns from buying a futures contract and settling it at expiration

Sources: Authors' calculations; Pinnacle Data

The Role of Net Hedging Pressure

The net hedging pressure theory suggests that the net of producers' and consumers' hedging activity – the 'net hedging pressure' (NHP) – will determine whether an inducement needs to be paid to entice speculators to balance the market by taking offsetting long or short positions in futures contracts (Cootner 1960). If the volume of producer hedging outweighs the volume of consumer hedging, there will be a net short hedging position and so speculators will need

5 Some care must be taken in interpreting the results from sub-samples, as the assumption of unbiased expectations (see Appendix A) may be less valid over shorter periods, especially if the period does not contain a full commodity price cycle.

6 The BCOM (formerly the Dow Jones-UBS Commodity Index) and S&P GSCI are commodity indices commonly used by commodity index traders. These indices are constructed by rolling over primarily short-dated futures contracts for a number of commodities and are used as a benchmark for a range of investment products (for example, exchange-traded funds and notes).

7 Hamilton and Wu (2014) also find that the risk premium on short-term oil futures has decreased relative to longer-term futures since 2005, and attribute this to a sharp rise in oil futures trading volumes associated with the rise of commodity index investment.

to be enticed to go long to balance the market. To achieve this, the price of the futures contract will be set below the expected future spot price, so that there is a positive expected return to taking a long position in the contract – a positive commodity risk premium. Conversely, if the volume of consumer hedging outweighs that of producers (a net long hedging position), this will yield a negative commodity risk premium. Thus the NHP theory predicts a negative relationship between NHP and commodity risk premiums.

A number of factors could influence producers' and consumers' demand for hedging at any given time, and therefore the extent of NHP and size of commodity risk premiums, for example:

- Inventories: the level of current and expected inventories would be expected to have a positive relationship with risk premiums. Holding all else constant, expectations of high inventory levels in the future (which provides more certainty around commodity access) should reduce the incentive for consumers to hedge, while producers may have a greater incentive to sell forward.
- Price volatility: higher current and/or expected price volatility may lead to greater demand from hedgers, and to speculators demanding greater compensation for bearing the risk associated with increased uncertainty about future spot prices. Thus, higher levels of current and expected price volatility may lead to greater absolute risk premiums.

Empirical support of a relationship between a measure of NHP and commodity risk premiums has been mixed, which could reflect a number of factors. One explanation is that the theory is oversimplified and that other factors, such as the risk-bearing capacity of broker-dealers (who act as intermediaries for hedgers in commodities markets) influences the relationship between NHP and commodity risk premiums (Etula 2010). Another potential explanation is that there may be issues with the data used to construct NHP variables (discussed further below). In particular, the Commodity Futures Trading Commission's (CFTC) commercial position data, which are used frequently in the literature, include the positions of swap dealers, who act as intermediaries in commodities markets. While swap dealers often act as intermediaries for producers and consumers, meaning that their positions reflect hedgers' positions, they can also act as intermediaries for speculators. Therefore, the NHP variable derived from the CFTC commercial positioning data may, to some extent, also reflect speculators' positioning.

A third explanation, which has not been explored in the literature to date, is that the relationship between NHP and commodity risk premiums could be more robust when examining premiums for longer-maturity contracts, if producers and/or consumers prefer to hedge over longer horizons.[8] For example, if producers of a given commodity have a strong preference for hedging their expected exposure to prices in 12 months' time, due to the nature of their production schedule, a larger short NHP may be associated with a larger positive risk premium on futures contracts with a 12-month maturity, but not necessarily for a futures contract with a one-month maturity. This also suggests that, for a given commodity, risk premiums could differ quite substantially for futures contracts of different maturities depending on producer and consumer hedging preferences.

Panel regression analysis

Some of the observations outlined above highlight the potential for hedging activity to explain variation in the term structure of commodity risk premiums. In light of this, the following analysis aims to investigate two questions which, to our knowledge, have not previously been investigated:

1. Is there evidence of a statistically significant negative relationship between NHP and commodity risk premiums if premiums on

8 Another reason that the relationship may be more robust when longer-maturity futures contracts are considered is that these markets may have larger barriers to entry which limit the number of speculators in the market and therefore prevent the risk premiums from being competed away.

longer-dated contracts are incorporated into the analysis?

2. Is there stronger statistical evidence of a negative relationship between NHP and commodity risk premiums on longer-dated futures contracts than shorter-dated futures contracts?

We use panel regressions to examine the relationship between a measure of NHP and commodity risk premiums for commodity futures contracts with different maturities. The cross-section is made up of around 500 different contracts, with each representing a commodity contract with a particular maturity (e.g. oil with a one-month maturity, oil with a two-month maturity). Specifically, we estimate:

$$Return_{c,m,t} = \gamma_{c,m} + \theta_t + \beta NHP_{c,t} + e_{c,m,t}$$

where $Return_{c,m,t}$ is the annualised excess return on commodity c, with contract maturity m, entered into at time t. The $\gamma_{c,m}$ are contract fixed effects that will account for omitted time-invariant factors, such as whether the commodity is storable. The θ_t are time fixed effects, which should help to capture omitted factors such as the global growth cycle.[9]

The main coefficient of interest is β, the coefficient on the independent variable $NHP_{c,t}$. This variable is constructed using CFTC data on commercial positions in futures contracts. Specifically, it is measured as net commercial positions, scaled by gross commercial positions, or:

$$NHP_{c,t} = \frac{Long\ positions_{c,t} - Short\ positions_{c,t}}{Long\ positions_{c,t} + Short\ positions_{c,t}}$$

The *NHP* variable is commodity specific, but not contract specific. That is, while the *NHP* variable at time *t* differs between oil and copper, it does not differ between an oil futures contract with a one-month maturity and an oil futures contract with a two-month maturity. This is not ideal, as the NHP for a particular maturity is purported to be the actual determinant of the risk premium on that commodity futures contract. Using aggregated NHP data could mask differences in the NHP at different maturities as for some, if not all, commodities it is unlikely that the NHP is roughly equal across all maturities. For example, if producers and consumers have specific hedging preferences at different maturities or if there is seasonality in the positions data, this could make it harder to identify a statistically significant relationship between *NHP* and risk premiums. However, unfortunately data on commercial positions by maturity are not available.

Table 2 shows the results from the model.[10] If only risk premiums on the nearest-to-maturity contracts are included in the model, as is done in most of the literature, there is little evidence of a statistically significant relationship between *NHP* and risk premiums.[11] However, if returns on longer-dated futures contracts are included, we find strong evidence of a negative relationship, consistent with the NHP theory.

The results are similar if the β coefficient is allowed to differ for different commodity subsectors. If only the nearest-to-maturity futures contract is included, there is no evidence of a statistically significant relationship. However, when longer-dated futures contracts are included, there is evidence of a statistically significant negative relationship between *NHP* and risk premiums for the energy and agriculture subsectors, though not for the metals subsector.

The results show that including longer-dated futures contracts allows us to identify *NHP* as a determinant of commodity risk premiums. To some extent, this may reflect the increased number of

9 The contract and time fixed effects should also help to capture any portion of the risk premium that is related to 'systematic' risk, which reflects correlation between commodity prices and other asset prices, rather than 'idiosyncratic' risk. Capital asset pricing models of commodity risk premiums, such as Hirshleifer (1988), suggest that systematic risk should also contribute to the risk premium.

10 We estimate the model using cluster-robust standard errors as outlined in Thompson (2011). These errors are robust to serial correlation among errors for a single cross-sectional contract, cross-sectional correlation between contracts at time *t* and common serially correlated disturbances. A number of other less general error specifications were considered. However, given the nature of the data, and in particular the fact that the returns are estimated using overlapping horizons, we favoured a more general approach.

11 We use the nearest-to-maturity contract, rather than the one-month-to-maturity contract, to be more consistent with the literature.

observations, which should lead to more precisely estimated coefficients, rather than actually indicating a stronger relationship between *NHP* and risk premiums for longer-dated contracts. It should also not be surprising that we find a relationship between *NHP* and commodity risk premiums using all contracts rather than just short-term contracts given that the *NHP* variable is an aggregate of hedging positions across all maturities.

Table 2: Regression Results – β Constant across Maturities[(a)]

	Nearest-to-maturity contract	All contracts
All sectors	–0.13	–0.12***
	(0.08)	(0.04)
By subsector		
Energy	–0.58	–0.60**
	(0.47)	(0.30)
Agriculture	–0.11	–0.12**
	(0.09)	(0.05)
Metals	–0.12	0.03
	(0.18)	(0.12)

(a) *, ** and *** indicate significance at the 10, 5 and 1 per cent level, respectively; standard errors are shown in parentheses
Sources: Authors' calculations; Pinnacle Data

To estimate precisely whether there is a stronger relationship between NHP and commodity risk premiums at specific maturities, we would need the *NHP* variable to vary by maturity. As already noted, however, NHP data are not available by maturity. Instead we can try and infer something about the relationship across the curve by allowing β to differ across maturities. Overall, the results suggest that the relationship between *NHP* and risk premiums is negative (as theory suggests) and of a similar magnitude across different maturity buckets for commodities in the energy and agricultural subsectors, although the coefficients are only statistically significant on longer-dated futures contracts (Table 3).[12] In contrast, the relationship for the metals subsector between *NHP* and risk premiums is negative (and statistically significant) only at the short end of the futures curve.

Table 3: Regression Results – β Varying across Maturities[(a)]

	1-month	2-month	3-month	4–6 month	7–12 month	13–18 month	19–24 month
All sectors	–0.21**	–0.15	–0.11	–0.12**	–0.11***	–0.14**	–0.02
	(0.11)	(0.10)	(0.08)	(0.06)	(0.04)	(0.05)	(0.09)
By subsector							
Energy	–0.72	–0.45	–0.50	–0.62	–0.60	–0.68***	–0.46***
	(0.46)	(0.44)	(0.44)	(0.43)	(0.36)	(0.23)	(0.10)
Agriculture	–0.16	–0.14	–0.11	–0.11*	–0.12**	–0.12**	0.04
	(0.13)	(0.09)	(0.08)	(0.06)	(0.05)	(0.05)	(0.11)
Metals	–0.26**	–0.09	0.00	0.03	0.12	0.02	0.06
	(0.11)	(0.08)	(0.09)	(0.12)	(0.14)	(0.12)	(0.14)

(a) *, ** and *** indicate significance at the 10, 5 and 1 per cent level, respectively; standard errors are shown in parentheses
Sources: Authors' calculations; Pinnacle Data

12 Maturity buckets were used, rather than individual maturities, for two reasons. First, it significantly reduced the number of coefficients to be estimated. Second, for a sizeable proportion of the commodities there were relatively few observations for longer maturities, which could make it difficult to estimate separate coefficients for each maturity. Pooling the maturities is likely to ameliorate this issue somewhat.

Conclusion

This article has found evidence that suggests commodity risk premiums are not constant across futures contract maturities, and that the shape of the 'commodity risk premium curve' differs across commodities and over time. The data suggests that the risk premiums on crude oil and heating oil, especially on short-dated contracts, have declined over time consistent with increased financial investment in commodities putting downward pressure on risk premiums. One explanation for the existence of commodity risk premiums is the process of transferring price risk amongst market participants via hedging. Consistent with this, there is quite strong evidence of a relationship between a measure of net hedging pressure and commodity risk premiums, as suggested by the net hedging pressure theory, when we include returns on longer-dated futures contracts. Furthermore, the results suggest that there is evidence of a relationship between net hedging pressure and risk premiums for commodities in the energy and agriculture subsectors, but not in the metals subsector.

Appendix A

In this article commodity risk premiums were calculated by using the average annualised excess returns over a time period. The realised (continuously compounded) excess return for any contract will be the risk premium plus any unexpected deviation of the observed spot price at expiry from the expected future spot price (as at the date when the contract was entered):

$$\begin{aligned} \textit{Excess return}_{c,m,t} &= \ln\left(S_{c,t+m}\right) - \ln\left(F_{c,m,t}\right) \\ &= \ln\left(S_{c,t+m}\right) - E_t\left[\ln\left(S_{c,t+m}\right)\right] \\ &\quad + E_t\left[\ln\left(S_{c,t+m}\right)\right] - \ln\left(F_{c,m,t}\right) \\ &= \textit{Risk premium}_{c,m,t} + e_{c,m,t} \end{aligned}$$

where $F_{c,m,t}$ is the futures price for commodity c, at time t, for maturity horizon m; $S_{c,t+m}$ is the spot price for commodity c at the maturity date $t+m$; and E_t indicates expectations at time t.

Assuming investors' expectations are unbiased, the average unexpected deviation of the spot price – $e_{c,m,t} = \ln\left(S_{c,t+m}\right) - E_t\left[\ln\left(S_{c,t+m}\right)\right]$ – over the sample should be zero. Therefore, on average, the excess return should be equal to the risk premium. This method is consistent with the methodology used in Gorton and Rouwenhorst (2006), which they note is consistent with the definition of risk aversion in the finance literature.

To calculate the excess returns, a database of futures contracts was constructed for 26 commodities.[13] These contracts were then used to construct a times series of the commodity futures curves. Specifically, a futures curve was constructed for each commodity, each month, with the date based on the expiry date of the futures contracts. The price of expiring contracts were considered to be the spot price, while the price of the contract maturing in one month's time was considered to be the one-month maturity price, and so on. These futures curves could then be used to look at the return of holding a futures contract (with a particular maturity) to maturity, the excess return, and therefore the *ex post* risk premium (the average of these returns).

It is important to note that futures curves with futures prices at each maturity were not available for most commodities, as most commodities do not have contracts expiring in each calendar month. For example, consider Table A1 below, which shows a commodity that has futures contracts expiring every second month. At time t, we would calculate returns for maturities 2, 4, 6, 8 etc. but then at time t + 1 we would have returns for maturities 1, 3, 5, 7 etc. As we move through time, we calculate returns for every month where an observation is available. We then take the arithmetic average of the returns across maturities. Further, the availability (and/or liquidity) of futures contracts over our sample and out to 24 months varied across commodities, and therefore futures curves could not be constructed for the same maturity profile across all commodities.

13 Please contact authors for further details on the commodities used.

Table A1: Example Commodity Expiration Schedule[(a)]

	Month								
	Spot	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
t	Y		Y		Y		Y		Y
t + 1		Y		Y		Y		Y	
t + 2	Y		Y		Y		Y		Y
t + 3		Y		Y		Y		Y	

(a) Y denotes an observation; whole numbers denote months
Source: RBA

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