

Bulletin

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Labour Market Outcomes in Regional Australia

Michelle Cunningham and Kathryn Davis*

Labour market outcomes in regional areas of Australia have followed broadly similar trends to those in capital cities over the past two decades. The range of unemployment rates across the regions narrowed through the 2000s, as the benefits of economic growth were spread broadly across the country. Nonetheless, there are still some notable differences between labour market outcomes in certain regions, partly reflecting the variation in industry structure across regional areas of Australia.

Introduction

Regional Australia accounts for just over one-third of Australia's population and makes a large contribution to the national economy. There is significant diversity in the industry structure across different regions – with, for example, some regions more focused on agriculture, mining or manufacturing than others. Consequently, understanding economic developments in regional areas is important, especially during periods when there is significant divergence in industry performance. The Reserve Bank monitors these developments through its business liaison program, with State Offices in five capital cities and regular visits by Bank staff to regional areas to gather information on local conditions. In addition to these firsthand reports, the Bank monitors and analyses the available data on state and regional developments.¹

As a product of this work, this article examines recent labour market outcomes across regional Australia. Overall, the article shows that trends in regional labour markets during the past two decades have been broadly similar to those in capital cities, and that unemployment rates across the different regions have tended to converge towards the national average. However, there remain some significant differences in labour

market outcomes across individual regions, in part reflecting differences in industry structure. In particular, regions with a higher-than-average share of employment in mining and agriculture have tended to have lower unemployment rates than regions where employment is more concentrated in the manufacturing and tourism industries.

Definitions

Regional Australia is defined in this article as the area outside the capital city boundaries, as set by the Australian Bureau of Statistics (ABS). The capital city boundaries include areas where the population has strong links to the central business districts and surrounding urban centres (for example, it is possible to commute there for work) as well as those areas covering the expected expansion of the cities over the next 20 years. Outside these boundaries, regional Australia includes large population centres such as Newcastle, the Gold Coast and Geelong, mid-sized towns like Dubbo and Geraldton, and less populous towns and country areas.

Data for regional Australia can be disaggregated in several ways. The ABS labour force survey (LFS) shows unemployment rates and participation rates for around 30 statistical regions outside the capital cities, and these data are used here to compare recent labour market developments across regions.²

* The authors are from Economic Analysis Department.

1 For earlier Reserve Bank analysis of state and regional developments, see Deverell and La Cava (2008) and Stevens (2010).

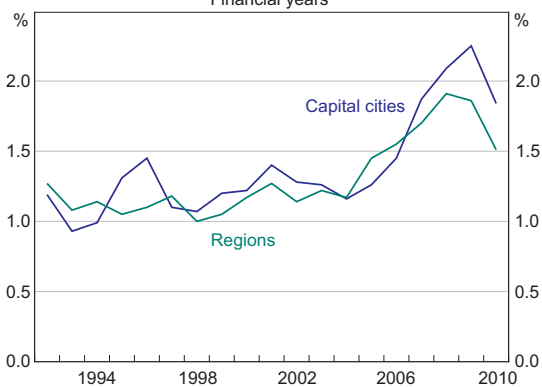
2 The number of statistical regions varies over time because regional boundaries are redrawn following each census.

Unemployment rates and population data can be further disaggregated into statistical local areas (SLAs) using information from the Department of Education, Employment and Workplace Relations (DEEWR) and the ABS Regional Population Growth release.³ These disaggregated data can be used to analyse the relationship between regional labour market outcomes and the industry structure of each region.⁴

Comparing Capital Cities and Regions

The population of regional Australia has grown at around the same pace as that of the capital cities over the past two decades (Graph 1). Regional population growth averaged 1.3 per cent a year between 1992 and 2010, only slightly below the 1.4 per cent average annual growth in the capital cities. Population growth in regional areas outpaced growth in the capital cities in 2005 and 2006, partly due to population flow into mining areas, but has lagged since then.

Graph 1
Population Growth
Financial years*



* Data spliced in 1996 and 2001 due to changes in regional boundaries
Sources: ABS; RBA

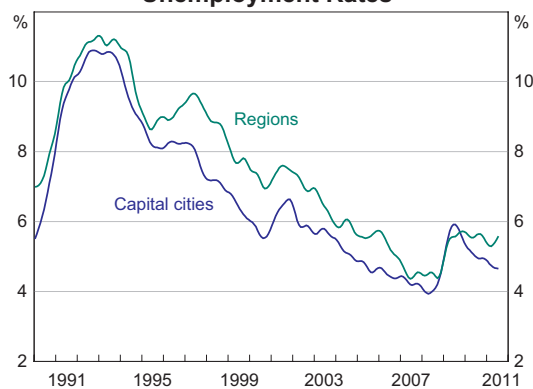
3 DEEWR's small area labour markets release disaggregates the regional data from the ABS labour force survey, using data on Centrelink unemployment benefits.

4 As some of the SLAs are very small, the analysis here focuses on the 641 SLAs that had more than 500 people employed based on the 2006 Census. The number of SLAs varies over time because regional boundaries are redrawn following each census. There are missing data for some SLAs around the time of boundary changes.

Labour markets in the capital cities and regions have followed broadly similar cycles over the past two decades (Graph 2). Capital city and regional unemployment rates rose to a peak of around 11 per cent during the early 1990s recession, before declining as the economy recovered. In the mid 1990s, unemployment rates stabilised in the capital cities and rose a little in the regions, before resuming their downward trend. In 1997, the unemployment rate in regional areas was around 1½ percentage points above that in the capital cities, and the gap remained around that level for the next few years. However, as the labour market tightened through the 2000s, the regional unemployment rate converged towards that in the capital cities. During the late 2000s downturn, unemployment rates rose in both the capital cities and the regions, and subsequently declined. The change in the unemployment rate was, however, more pronounced for the capital cities.

Labour force participation rates in regional areas and capital cities have also displayed similar trends, with participation rates rising by a little more than 2 percentage points over the past decade in both cases (Graph 3). The rise in participation rates reflects similar social and economic factors; labour force participation by female and older workers picked up notably in regions as well as in the capital

Graph 2
Unemployment Rates*



* Smoothed using 13-period Henderson trend; ABS LFS includes Canberra and Darwin in regions
Sources: ABS; RBA

cities (Graph 4). The participation rate for females in regional areas converged towards that in the capital cities over the past two decades, although the participation rate for males in regional areas generally remained below that in the capital cities.

Comparing Regions

While unemployment rates in capital cities and regional areas have followed broadly similar trends over the past two decades, there has been a wide range of outcomes for individual regions.⁵ For the current 29 statistical regions in the ABS labour force survey, recent unemployment rates have ranged from 11 per cent in Wide-Bay Burnett (which includes Maryborough and Bundaberg in Queensland) to 2 per cent in the South Eastern Statistical Region of New South Wales (which includes Goulburn and Cooma); 80 per cent of regions have unemployment rates ranging between 3 and 8 per cent (Graph 5).⁶

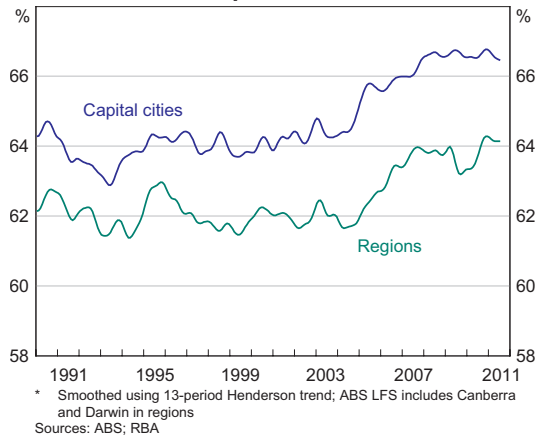
Although regional differences remain noteworthy, the dispersion in unemployment rates has narrowed over time. The range between the highest and lowest unemployment rates averaged around 11 percentage points in 1994, compared with 9 percentage points over the past year. Importantly, for the central 80 per cent of the distribution, the range was 7 percentage points in 1994 and 4 percentage points over the past year.

Another way to examine this issue is to look at the relationship between regions' unemployment rates in the late 1990s and the size of their subsequent decline. Regions that started with higher unemployment rates have tended to experience larger declines in their unemployment rates over the following decade or so than regions that began the period with lower unemployment rates

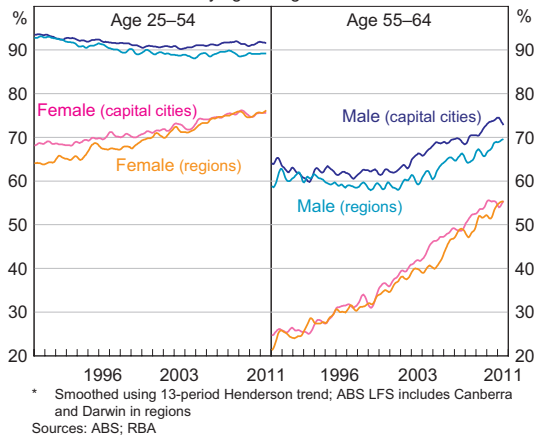
5 For other analysis of differences in regional unemployment rates, see Australian Government (2011) and Borland and Kennedy (1998).

6 In general, the most disaggregated data from the ABS labour force survey have been used; an exception was the 'Northern, Far West-North Western and Central West' statistical region in New South Wales because of missing data for one of its sub-components.

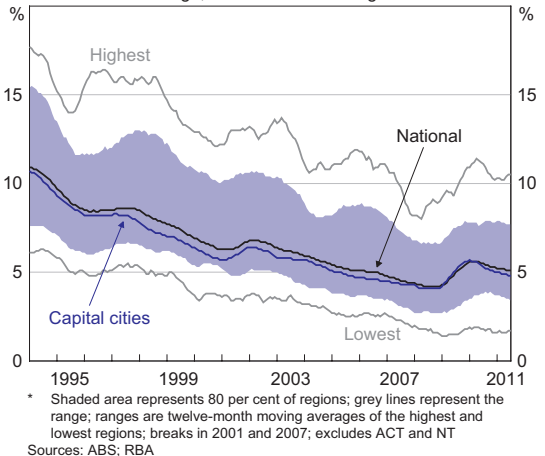
Graph 3
Participation Rates*



Graph 4
Participation Rates*
By age and gender



Graph 5
Regional Unemployment Rates
Range, twelve-month average*



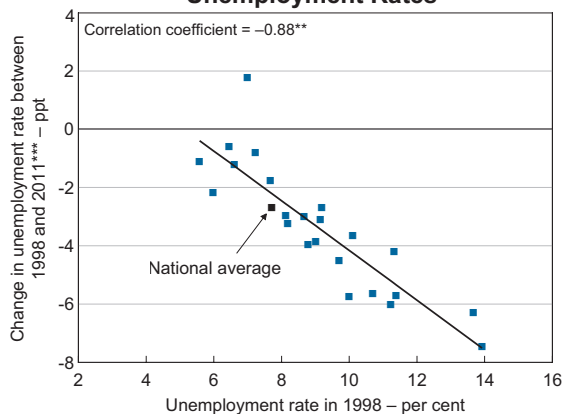
(Graph 6). As a consequence, unemployment rates have converged over time.

This convergence of unemployment rates across the regions appears to have been mainly driven by unemployed people moving into employment (either in their region or another), rather than leaving the labour force. Using census data to calculate regional employment growth rates, the regions that experienced larger declines in their unemployment

rates were also generally those regions that experienced stronger employment growth (Graph 7).

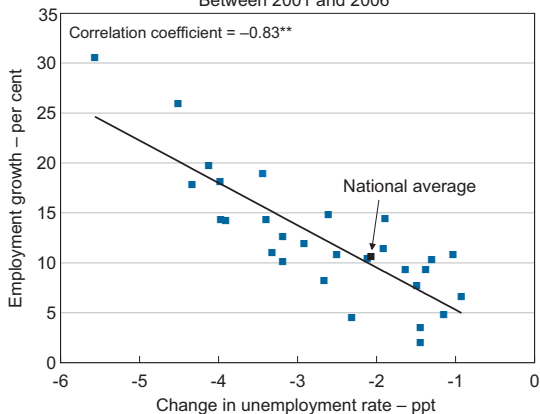
Most regions have experienced an increase in labour force participation regardless of their unemployment rate in the late 1990s. Moreover, participation rates have tended to rise by more in regions that experienced larger declines in their unemployment rates, indicating that more people entered the labour market as jobs became more readily available (Graph 8).⁷

Graph 6
Unemployment Rates*



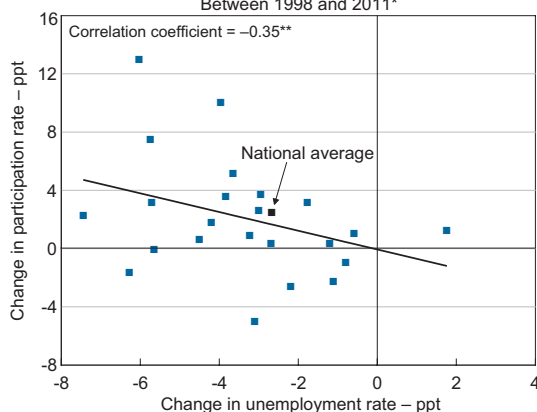
* For 23 statistical regions where regional boundaries were unchanged over this period
 ** Significant at the 1 per cent level; trend line estimated using ordinary least squares
 *** Year to July 2011
 Sources: ABS; RBA

Graph 7
Change in Unemployment Rate and Employment Growth
Between 2001 and 2006*



* For 29 statistical regions in the census; regions differ slightly from the ABS LFS
 ** Significant at the 1 per cent level; trend line estimated using ordinary least squares
 Sources: ABS; RBA

Graph 8
Change in Unemployment Rate and Participation Rate
Between 1998 and 2011*



* Year to July 2011; for 23 statistical regions where regional boundaries were unchanged over this period
 ** Significant at the 10 per cent level; trend line estimated using ordinary least squares
 Sources: ABS; RBA

Industry Composition and Labour Markets across Regions

Another way of examining regional labour market outcomes is to group regions with similar industry structures and investigate whether differences between regions grouped in this way help to explain variations in their unemployment rates.⁸ For some regions, the industry structure of the labour market is similar to that in the capital cities, with the share of employment in each industry close to that

⁷ See DeBelle and Vickery (1998) for additional discussion of various adjustment mechanisms. For a detailed examination of these factors between 1986 and 1996, see Lawson and Dwyer (2002).

⁸ See Garnaut *et al* (2001) for detailed analysis of industry influences on employment in regional Australia between 1986 and 1996.

for the national average. Other regions have industry structures that are quite different to the rest of the country. For example, in a few regions around half of all employed people work in the mining industry, compared with the national average of less than 2 per cent.

To examine regional labour markets by industry structure, the data were disaggregated into the 641 regional SLAs that had more than 500 employed people based on the 2006 Census. These SLAs were classified into five industry groups: agriculture, mining, manufacturing, tourism (represented by the accommodation & food services industry) and 'other' (Table 1).

Each SLA was included in the group for which the industry share of total employment was the highest relative to that industry's share of employment at the national level.⁹ Regions where there was no clear difference between industries' share of employment and the national averages, or where the dominant industry was not agriculture, mining, manufacturing or tourism, were classified under 'other'.¹⁰ For example, SLAs such as Bourke (NSW) and Gatton (QLD) were included in agriculture, Kalgoorlie/Boulder (WA) and East Pilbara (WA) were included in mining, Corio (VIC) and Mount Gambier (SA) were included in manufacturing, and Byron Bay (NSW) and Surfers Paradise (QLD) were included in tourism.

Table 1: Regional Industry Classification
2010

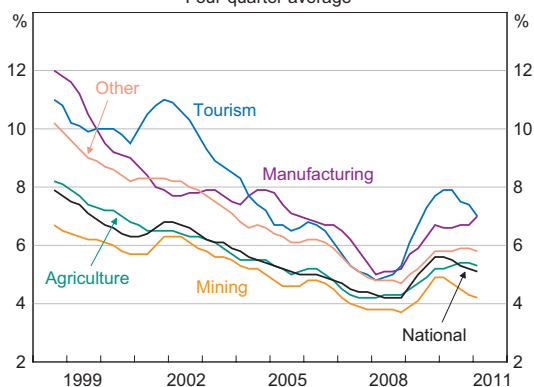
Dominant industry in region	Number of SLAs	Population	Share of regional population
		Millions	Per cent
Agriculture	314	2.0	25.6
Mining	30	0.5	5.7
Manufacturing	24	0.4	4.4
Tourism	23	0.3	4.3
Other	250	4.8	60.0

Sources: ABS; RBA

⁹ The regions included in each industry group change slightly following each census.

¹⁰ To avoid classifying regions into an industry group when there was only a marginal difference between the industry share of employment in the region and the national share, or where no single industry was dominant, a region was only included in an industry group when: there was more than a 50 per cent difference between the region's dominant industry share and the national industry share; and there was at least 2 percentage points between the dominant industry's share relative to the national average and the next largest industry's share relative to the national average. The results are robust to a range of different benchmarks.

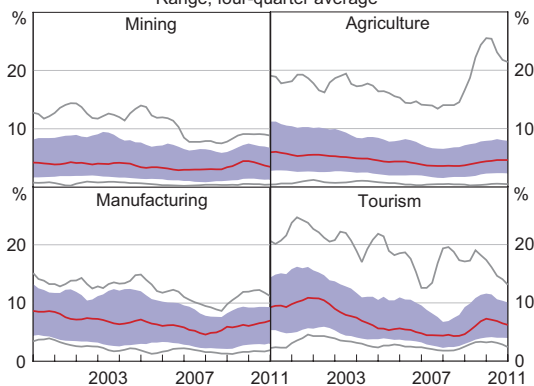
Graph 9
Regional Unemployment Rates
Grouped by Dominant Industry
 Four-quarter average*



* Average for industry group, weighted by size; breaks in 2001 and 2007; data missing for some SLAs in June and September 2007

Sources: ABS; DEEWR; RBA

Graph 10
Regional Unemployment Rates
Grouped by Dominant Industry
 Range, four-quarter average*



* Shaded area represents 80 per cent of regions; red line is the median; grey lines represent the range; ranges are four-quarter moving averages of the highest and lowest regions; breaks in 2001 and 2007; data missing for some SLAs in June and September 2007

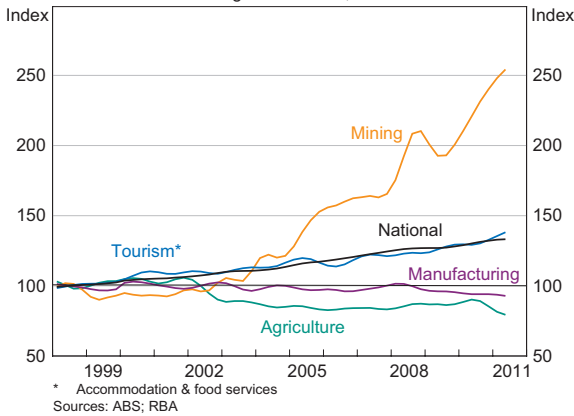
Sources: ABS; DEEWR; RBA

These data suggest that, over the past decade, regional areas that were heavily focused toward mining have tended to have unemployment rates that were lower than average, agricultural areas have generally had around average unemployment rates, and areas focused on manufacturing and tourism have tended to have above average unemployment rates (Graph 9). While there remains significant diversity among unemployment rates within each industry group, these results hold for the majority of SLAs classified within each group (Graph 10). Furthermore, the nationwide trend toward less dispersion in unemployment rates across regions over the past decade is broadly apparent within each group. (An exception is agriculture, where although the range of outcomes for the central 80 per cent of agricultural regions has narrowed over time, the unemployment rate for a few SLAs in North Queensland rose sharply in 2009.)

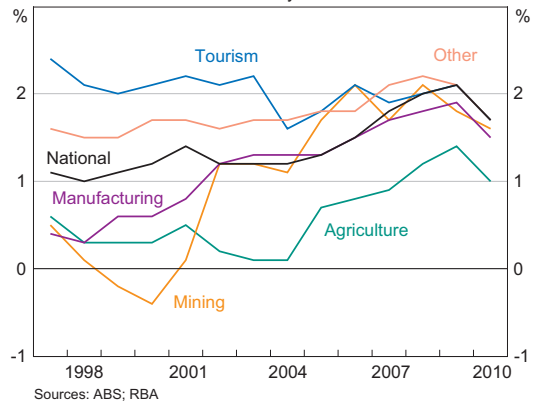
The low average unemployment rates in mining and agricultural regions are likely to reflect, in part, significant labour mobility in and out of these regions. In general, when employment in the mining and agricultural industries has declined, there has not been a notable increase in the average unemployment rate in the regions where these industries are dominant. National mining employment fell in the late 1990s, but the unemployment rate in mining regions remained low, and the population of mining towns declined during this period (Graphs 11 and 12).¹¹ Similarly, agricultural employment fell in the early 2000s, with little impact on the unemployment rate in agricultural regions, which experienced almost no population growth during this period. From 2003, national mining employment recovered sharply, and population growth in the mining regions also

¹¹ Employment by industry is shown at a national level as a time series is not available for SLAs. Note that unemployment rates in this article are based on place of residence, not place of employment, and so cannot account for 'fly-in fly-out' workers. For further details on developments in the mining sector and mining employment over the past decade, see Connolly and Ormond (2011). For discussion of the long-run changes in the industry structure of Australian employment, see Connolly and Lewis (2010).

Graph 11
Employment by Industry
Average 1998 = 100, trend



Graph 12
Regional Population Growth
Grouped by Dominant Industry



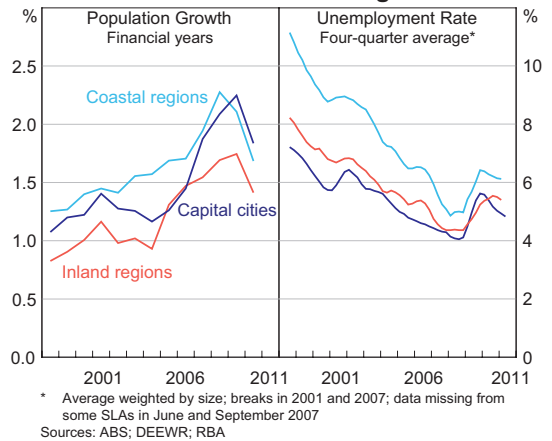
accelerated. Employment in agricultural regions has been relatively flat since the early 2000s, and population growth in these areas has remained below average.

In contrast, regions that are heavily focused towards manufacturing or tourism have experienced population growth around, or above, the national average for most of the past decade, despite higher than average unemployment rates. The labour mobility adjustment mechanism appears to be more important for agricultural and mining regions than for tourism and manufacturing regions; this may reflect differences in regional amenity such as location. While unemployment rates in manufacturing and tourism regions have moved towards the national average over most of the past decade, there has been some divergence since the late 2000s downturn.

Differences between Coastal and Inland Regions

Regional labour market outcomes also vary between coastal and inland areas. While population growth in regions has, in aggregate, been broadly in line with growth in the capital cities, there are marked differences between coastal and inland

Graph 13
Coastal and Inland Regions



regions (Graph 13, left panel).¹² Population growth in coastal regions has been notably higher than in inland regions, with annual average population growth of 1.7 per cent and 1.3 per cent, respectively, between 1998 and 2010. Unemployment rates have also been higher in coastal regions than in inland regions, although the gap narrowed through the 2000s (Graph 13, right panel). Over the past year,

¹² For detailed analysis of population growth across regions, see BITRE (2011) and Garnaut *et al* (2001).

the unemployment rate for coastal regions has averaged 6.1 per cent compared with 5.4 per cent for inland regions. The higher unemployment rate in coastal regions may reflect a lower likelihood that unemployed people leave these regions to find work elsewhere – perhaps reflecting lifestyle choices – as well as differences in education, skills and the age structure of their population.

Conclusion

Over the past two decades, labour market outcomes in the regional areas of Australia have followed a broadly similar pattern to those in the capital cities. There are notable differences across regions, however, which can be partly explained by variations in regions' industry composition. Regions that are more heavily focused on mining have had low unemployment rates and unemployment rates in agricultural regions have been broadly in line with the national average. Meanwhile, tourism and manufacturing-focused regions have had above average unemployment rates. Nevertheless, the range of unemployment rates across different regions has narrowed over the past decade or so, as the benefits of economic growth have been spread broadly across Australia. ✎

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The Exchange Rate and Consumer Prices

Elaine Chung, Marion Kohler and Christine Lewis*

This article reviews the empirical evidence on exchange rate pass-through to consumer prices in Australia over the inflation-targeting period. It finds that pass-through is relatively low at the aggregate level but is faster and larger for the prices of manufactured goods, which are often imported. There is some evidence that over the past decade exchange rate movements have been flowing through more quickly to retail prices for this subset of highly tradable goods. Looking ahead, the growth of the internet with the greater ability of households to compare prices and to buy from overseas are likely to result in smaller cross-country price differentials and more rapid pass-through from the exchange rate to prices.

Introduction

With the recent large movements in the Australian-dollar exchange rate and almost two decades of inflation targeting, it is timely to revisit the effects of exchange rate movements on domestic consumer prices. This article examines the pass-through of changes in the exchange rate to consumer prices over this period.

While first-stage pass-through – from the exchange rate to import prices – is found to be high and rapid, the effect of exchange rate changes on overall consumer price inflation is smaller and slower: a 10 per cent appreciation of the Australian dollar is estimated to lower the level of overall consumer prices by around 1 per cent over a period of around three years. Although pass-through is larger for some highly tradable goods, exchange rate movements still have a less than one-to-one effect on these prices, reflecting the significant domestic component of the retail price of these goods. However, pass-through for these highly tradable goods appears to have become quicker in the past decade.

Estimating the Effect of Exchange Rate Movements on Consumer Prices

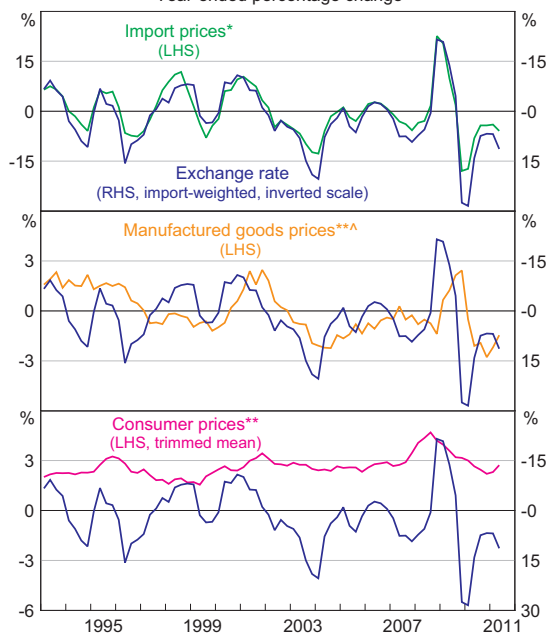
The effect of changes in the exchange rate on consumer prices can be divided into different stages (Graph 1). The first stage is the effect of exchange rate movements on the Australian-dollar cost of imports when they arrive in the country. The second stage is the effect that changes in the prices of imported goods have on overall consumer prices. The transmission may be fairly direct, for example when consumers buy imported goods, or it may be indirect, where the prices of domestically produced goods and services are affected by changes in the cost of imported inputs.

Researchers typically estimate the first and second stages of exchange rate pass-through using econometric regressions which attribute changes in domestic prices to contemporaneous and prior changes in the exchange rate or import prices and to other variables. The two stages are generally estimated separately, that is, by estimating the effect of exchange rate changes on import prices and then the effect of import prices changes on overall consumer prices.¹ Further details of some standard regressions are shown in Appendix A.

* The authors are from Economic Analysis Department.

¹ As a cross-check, models linking inflation directly to exchange rate changes were also estimated. The results were very similar to those from the two-stage models, although they tend to be econometrically less robust.

Graph 1
Exchange Rate and Consumer Prices
 Year-ended percentage change



* Excludes large lumpy items, lubricants & oils, and automatic data processing equipment
 ** Adjusted for the tax changes of 1999–2000
 ^ Manufactured goods here refers to clothing, footwear, furniture & floor coverings, motor vehicles, audio, visual & computing equipment and similar items
 Sources: ABS; RBA

Estimates of first-stage pass-through show that changes in the Australian-dollar prices of imports can be explained well by changes in the exchange rate and by changes in world prices. The econometric estimates in Table 1 indicate that exchange rate changes are usually passed through quickly and to a large extent to import prices, confirming the close relationship between exchange rate movements and import price inflation apparent in the top panel of Graph 1. The point estimates suggest that a 10 per cent appreciation in the exchange rate typically lowers import prices by around 8 per cent. However, the proposition that the effect is 10 per cent – that there is ‘full pass-through’ – is sometimes not rejected in statistical tests.

The second stage relates movements in overall consumer price inflation to changes in import prices.² The results for the second stage presented

2 If first-stage pass-through is very high, the effect of changes in import prices on consumer prices will be broadly equivalent to the effect of changes in the exchange rate.

here are based on two of the frameworks used at the Bank for modelling inflation. The mark-up framework models consumer prices as a mark-up over costs and therefore usually includes unit labour costs (average labour cost per unit of output) and import prices. The other framework is the Phillips curve model, which relates inflation to resource utilisation, in particular the unemployment rate, with inflation typically expected to rise as the level of spare capacity is reduced. This framework also incorporates a role for inflation expectations and for the exchange rate, through import prices.³

The results indicate that the pass-through of exchange rate changes to overall consumer prices occurs gradually over an extended period. The estimates shown here suggest that a 10 per cent exchange rate appreciation can typically be expected to result in a reduction in overall consumer prices (modelled in underlying terms) of around 1 per cent, spread over around three years. This result is consistent with previous research (Heath, Roberts and Bulman 2004; Norman and Richards 2010).

The effect of exchange rate changes on consumer prices is stronger for manufactured consumer goods, which are often either imported or exposed to import competition so that their prices have a high degree of co-movement with the exchange rate (Norman and Richards 2010). These goods include clothing, footwear, household appliances, furniture, motor vehicles, books and recreational equipment.⁴ For these goods, the estimates suggest that a 10 per cent appreciation of the exchange rate lowers retail prices by around 2–3 per cent, over around 2½ years.

3 These frameworks are single-equation models that potentially omit other channels that might be captured in a systems approach. For example, in addition to the direct effect of the exchange rate on prices through the cost of imported goods, there may be indirect effects via the effect on economic activity or inflation expectations.

4 Here we focus on the subset of manufactured goods with prices linked most closely to world prices rather than the broader group of ‘tradable’ goods included as an analytical series in the Consumer Price Index release. Items such as automotive fuel, food, pharmaceuticals, alcohol, tobacco and overseas travel & accommodation are excluded from ‘manufactured goods’.

Table 1: Exchange Rate Pass-through to Prices
 Estimated response to a 10 per cent appreciation, per cent^(a)

	Total exchange rate pass-through	Pass-through after first year	Number of quarters for 75 per cent of total effect
First-stage pass-through to import prices	-8	-8	1
Second-stage pass-through of import prices to:			
Consumer prices ^(b)	-1	-0.2	10
Manufactured goods prices	-2 to -3	-2	5

(a) For expositional reasons, the effect of a 10 per cent change in the exchange rate is shown, multiplying the model coefficient by the factor 10; the log function used in the models yields a good approximation of percentage changes for small changes of the exchange rate; the sample period is 1992:Q1–2011:Q1

(b) Measured using trimmed mean inflation
 Source: RBA

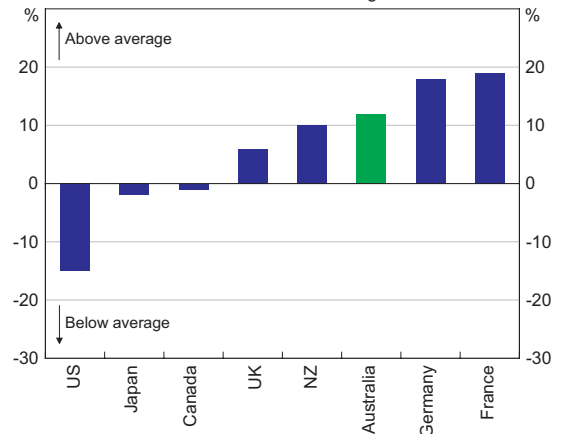
Understanding Exchange Rate Pass-through

The results summarised above suggest that first-stage pass-through in Australia is very high, which is not surprising since import prices largely reflect the domestic-currency cost of the good from the foreign supplier, which can be expected to vary in line with the exchange rate. However, first-stage pass-through need not be ‘full’ – that is, a 10 per cent appreciation of the exchange rate might not lead to a 10 per cent reduction in import prices – if there is ‘pricing to market’ or ‘price discrimination’. Pricing-to-market means a foreign supplier adjusts its export prices depending on the national market to which it exports. This might occur if foreign suppliers perceive that consumers in different economies are willing to pay different prices because they have different preferences or income levels (Krugman 1987). Another reason is that foreign suppliers might judge that the intensity of competition for their product differed across economies. Moreover, foreign suppliers may choose to smooth the effect of fluctuations in the exchange rate that are perceived to be temporary.

There is indeed a significant amount of evidence showing persistent differences in prices of tradable goods across economies (Rogoff 1996; Goldberg and Knetter 1997). While there are a number of

difficulties associated with comparing prices across economies, the OECD has constructed cross-country comparisons of price levels for some types of highly tradable consumer goods, including clothing & footwear, furnishings & equipment, and transport equipment. These data show significant differences in prices across economies in 2005 and 2008, with the price levels of a range of consumer durable items in Australia estimated to be higher than those in a number of other developed economies, including the United States, although below those in many European economies (Graph 2).

Graph 2
Consumer Durables Price Levels in 2008
 Relative to OECD average*



* Weighted by GDP at PPP exchange rates
 Source: OECD

There are a number of reasons for such differences in prices across economies, including differences in shipping costs.⁵ The Productivity Commission (2011) finds evidence that pricing-to-market by international producers also causes Australian prices for some goods to be higher than those in other countries. To the extent that such differences for traded goods represent pricing-to-market, they suggest foreign suppliers might choose to absorb some fluctuations in the exchange rate in their pricing. This could explain the fact that the estimates above suggest that first-stage pass-through for Australia has been a little less than complete over the past two decades.

The evidence on second-stage pass-through for manufactured goods indicates that the effect of the exchange rate on final retail prices is considerably smaller than the effect on import prices at the dock.⁶ The main reason for this is that the retail prices of imported goods include a significant domestic component, including transport costs, labour inputs, rents and profit margins for distributors and retailers. Estimates from liaison and from data sources such as the input-output tables from the national accounts suggest that these domestic costs typically account for around half of the final prices of retail goods. This factor, together with the choice of some domestic distributors and retailers to (partially) absorb currency fluctuations in their margins – especially when they judge them to be temporary – can explain why the average pass-through for manufactured goods is estimated at only 2 to 3 per cent following a 10 per cent appreciation.

The effect of exchange rate movements on the overall level of consumer prices is smaller again, with a 10 per cent exchange rate appreciation estimated to typically reduce overall consumer prices by around 1 per cent, over a period of up to three years. The bulk of this effect comes from manufactured goods, which have represented around one quarter of the CPI

basket during the inflation-targeting period.⁷ There is also some pass-through to goods and services that are produced domestically, which account for the majority of prices in the CPI. This arises through the use of imported capital goods and intermediate inputs, although domestically sourced goods and services, including labour, make up a larger share of inputs in their production. Accordingly, modelling based on data for the past two decades suggests that movements in import prices or the exchange rate have had only modest impacts on inflation for domestically produced goods and services.

Changes in Pass-through over Time

One fairly common finding for Australia and other economies has been that econometric estimates of the overall pass-through to consumer prices have been lower over the past two decades than in earlier years. Recent Australian studies have suggested a significantly lower pass-through than studies using data over the 1980s and early 1990s. Indeed, a decline in pass-through starting in the 1990s has been documented for a number of developed economies, including the United States, United Kingdom and Canada (see, for example, Bailliu, Dong and Murray (2010)). Taylor (2000) suggests that the adoption of inflation targeting may have contributed to this outcome. In particular, a stronger anchor for inflation expectations should make it less likely that temporary shocks to inflation – that could result, for example, from a change in the exchange rate – feed through to higher inflation expectations and thus become entrenched in higher inflation for a wider range of goods.

While estimates of pass-through in Australia have declined since the 1980s, the evidence suggests that pass-through to overall consumer prices in the 1990s was similar to that in the 2000s (Table 2). For manufactured goods, while there is little evidence that the overall degree of pass-through has changed,

5 Price differentials at the retail level also reflect distribution and retailing costs that differ across economies. These include local transport costs, taxes, and non-tradable costs such as the costs of a retail shopfront, local taxes, labour and insurance.

6 Second-stage pass-through is also slower than first-stage pass-through, which can be partly explained by the use of currency hedging by wholesalers and retailers.

7 Part of the exchange rate effect on consumer prices will also reflect the impact on goods, including some foods, which can be exported and sold internationally at world prices, as well as sold domestically. In this case, changes in the exchange rate are reflected in their export prices and therefore will also affect their prices domestically.

Table 2: Changes to Second-stage Pass-through
Estimated response to a 10 per cent fall in import prices^(a)

	Full sample 1992:Q1 to 2011:Q1	1992:Q1 to 2001:Q1	2001:Q2 to 2011:Q1
Consumer prices^(b)			
Estimate of pass-through (per cent)	-1	-1	-1
Adjusted R-squared	0.38	0.17	0.29
Manufactured goods prices			
Estimate of pass-through (per cent)	-2 ^(c)	-2	-2
Share within first year	0.9	0.7	1.0
Adjusted R-squared	0.44	0.21	0.48

(a) Estimates are from the Phillips curve models detailed in Appendix A

(b) Measured using trimmed mean inflation

(c) Results from the Phillips curve model; the range of estimates in Table 1 includes the mark-up model

Source: RBA

there is some evidence that pass-through has become faster in the past decade, compared with the 1990s. Estimates from a Phillips curve model suggest that after four quarters almost all of the exchange rate effect will have passed through to final prices of manufactured goods, compared with around two-thirds in the 1990s. Moreover, the models fit the data much better in the most recent decade, although the standard errors are still fairly large, so it is too soon to establish that the difference is statistically significant.

Faster pass-through of exchange rate movements to the retail prices of manufactured goods is consistent with a number of possible explanations. One is that the trend appreciation in the exchange rate over most of the 2000s has led to a perception that exchange rate shocks are more likely to be permanent. In this case, pass-through is likely to be faster, with wholesalers and retailers less likely to absorb exchange rate fluctuations if they perceive them to be permanent. A second possible explanation is that advances in technology have reduced the cost of changing prices for retailers. This means that exchange rate changes would be passed on faster, even if they may have to be reversed later on if the change in the exchange rate turns out to be temporary. A third possible explanation is that there has been reduced scope for pricing-to-market by domestic distributors and retailers due to the greater

ability of consumers to observe and take advantage of cheaper prices in both domestic and foreign markets, for example via the internet.

While it is unlikely that the latter explanation can fully explain the trend towards faster exchange rate pass-through seen between the 1990s and 2000s, it could be a significant factor in coming years. In particular, the growth of the internet has made differences in consumer prices across countries much more visible to consumers, while developments in the areas of payments and package forwarding have made it more feasible to shop internationally. Accordingly, it is possible that for a wide range of goods there will be reduced scope for significant differences in prices across economies. To date, the domestic online shopping market is estimated to comprise only around 4 per cent of the domestic retail market, with international online purchases likely to be equivalent to roughly 2 per cent of domestic retail sales (Productivity Commission 2011). As internet sales increase, it is possible that price differentials across economies will narrow, with reduced scope for pricing-to-market by foreign suppliers and domestic distributors and retailers. If this occurs, one consequence is likely to be a further increase in the pass-through from exchange rate changes to the prices of goods and services that are internationally tradable.

Appendix A

Given the large changes in the Australian-dollar exchange rate that have occurred since the float of the currency in 1983, and the importance of the exchange rate in influencing domestic consumer prices and activity, there is a long history of research at the Reserve Bank examining the effect of exchange rate changes on consumer prices (see, for instance, Richards and Stevens (1987); Dwyer and Lam (1994); Dwyer and Leong (2001); Heath *et al* (2004); Norman and Richards (2010)). The models used in this article draw on this earlier work and are detailed below. Pass-through is modelled both as a two-stage process – from the exchange rate to import prices and from import prices to consumer prices – and as a direct relationship between the exchange rate and consumer prices.

First-stage pass-through

Estimates of first-stage pass-through can be obtained from regressions where changes in import prices are assumed to be a function of contemporaneous and prior changes in the exchange rate and export prices:

$$\Delta pm_t = \sum_{i=0}^I \beta_i \Delta wep_{t-i} + \sum_{j=0}^J \gamma_j \Delta e_{t-j} + \varepsilon_t$$

where pm is domestic import prices, wep is world export prices, e is an import-weighted exchange rate index and ε is an error term. All variables are in logarithmic form and Δ denotes the change in a variable (the change in the log of a variable is – for small changes – approximately equal to the percentage change in the variable). Similar estimates for the long-run effect of the exchange rate can be obtained from autoregressive distributed-lag models (which include lagged changes in import prices) and from error-correction models, which assume a stable long-run cointegrating relationship between the variables.

Second-stage pass-through

Two of the frameworks used for modelling inflation at the Bank are the mark-up and the Phillips curve approaches.⁸ The mark-up model expresses underlying inflation as a function of domestic labour costs, inflation expectations and import prices. The Phillips curve controls for capacity utilisation through the unemployment rate and speed-limit term (how fast the unemployment rate changes), in addition to inflation expectations, and can be extended to include import prices (Gruen, Pagan and Thompson 1999). Specifically:

Mark-up model:

$$\pi_t = \alpha_0 + \sum_{i=1}^I \alpha_i \Delta ulc_{t-i} + \gamma_0 bond_{t-1} + \sum_{j=1}^J \beta_j \Delta pm_{t-j} + \theta_0 output_{t-1} + \varepsilon_t$$

Phillips curve model:

$$\pi_t = \alpha_0 + \alpha_1 \frac{1}{U_{t-1}} + \alpha_2 \Delta U_{t-1} + \gamma_0 bond_{t-1} + \sum_{k=1}^K \beta_k \Delta pm_{t-k} + \varepsilon_t$$

where π is inflation (trimmed mean or manufactured goods prices), ulc is nominal unit labour costs (in log form), $bond$ is a measure of inflation expectations derived from indexed bonds, $output$ is the output gap, U is the unemployment rate, and pm is tariff-adjusted import prices (in log form). The exact specifications of models and variables used for the estimates in Table A1 are based on Norman and Richards (2010).

8 The models outlined here use a measure of underlying inflation (the trimmed mean), rather than headline CPI inflation, as the dependent variable. The former gives a lower weight to the effect of noise and other temporary changes in headline inflation and yields equations that fit better than regressions for headline inflation.

Table A1: Second-stage Pass-through

	Trimmed mean inflation		Manufactured goods inflation	
	Mark-up model	Phillips curve model	Mark-up model	Phillips curve model
Constant	0.00***	-0.00	-0.00**	-0.00
Δ import prices	0.11***	0.08**	0.26***	0.23***
Bond market inflation expectations	0.00	0.00**	0.00**	0.00**
Δ unit labour costs	0.22**	na	0.05	na
Output gap	0.04**	na	na	na
1/unemployment rate	na	0.03***	na	-0.01
Δ unemployment rate	na	-0.00***	na	-0.00
Adjusted R-squared	0.30	0.38	0.43	0.44

Notes: ***, ** and * denote significance levels at 1, 5 and 10 per cent, respectively; sample period is 1992:Q1–2011:Q1; where multiple lags are included, coefficients shown are the sum of the lags

Source: RBA

Direct pass-through

In addition, the pass-through from exchange rate changes to inflation can be estimated directly by using the mark-up model and the Phillips curve. In these models, we replace import price inflation with lags of exchange rate changes and world export price inflation (Table A2). ✕

Table A2: Direct Pass-through

	Trimmed mean inflation		Manufactured goods inflation	
	Mark-up model	Phillips curve model	Mark-up model	Phillips curve model
Constant	0.00***	0.00	-0.00*	-0.00
Δ exchange rate	-0.09***	-0.08***	-0.22***	-0.19***
Δ world export prices	0.15**	0.16**	0.02	0.01
Bond market inflation expectations	0.00	0.00	0.00*	0.00*
Δ unit labour costs	0.18*	na	0.10	na
Output gap	0.04**	na	na	na
1/unemployment rate	na	0.03***	na	-0.01
Δ unemployment rate	na	-0.00	na	-0.00
Adjusted R-squared	0.36	0.44	0.33	0.35

Notes: ***, ** and * denote significance levels at 1, 5 and 10 per cent, respectively; sample period is 1992:Q1–2011:Q1; where multiple lags are included, coefficients shown are the sum of the lags

Source: RBA

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The Global Market for Liquefied Natural Gas

David Jacobs*

Liquefied natural gas (LNG) provides an economic means to transport natural gas over long distances, bringing production from remote gas reserves to market. A large expansion in global LNG trade is currently under way, and Australia is likely to emerge as the second largest supplier globally in coming years. This article describes the functioning of the global LNG market and outlines Australia's position within the market.

Introduction

The global market for LNG is of growing importance to the Australian economy. In recent years, significant investments in LNG production have been committed, with projects under construction currently totalling around A\$120 billion. If these projects proceed as planned, Australia's LNG exports are likely to increase more than three-fold over the next five years (see Christie *et al* 2011).¹ In addition to these committed projects, a number of other developments are being evaluated that could see LNG exports approach coal and iron ore in terms of their contribution to total export earnings over the coming decade.²

Natural Gas

Natural gas supplies around one-fifth of the globe's energy needs, compared with one-third from oil and one-quarter from coal (Graph 1). Natural gas has a wide variety of uses with the largest being power generation, followed by industrial uses (such as the production of chemicals) and residential

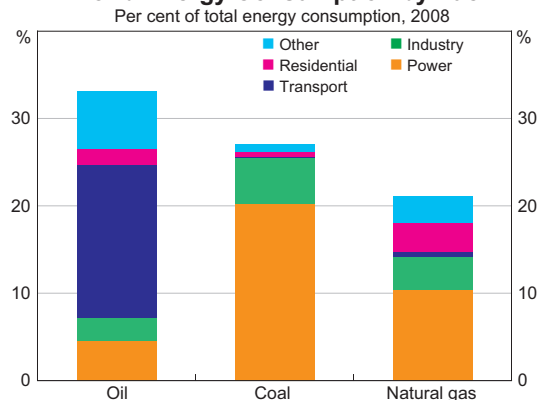
* The author is from Domestic Markets Department, and formerly from Economic Analysis Department, and would like to thank Virginia Christie for her valuable contributions.

1 These figures are based on projects that have received final investment approval: Australia Pacific LNG (phase 1), Gladstone LNG, Gorgon LNG, Pluto Foundation Project, Prelude FLNG and Queensland Curtis LNG. Some projects have received approval since Christie *et al* (2011).

2 The global market for bulk commodities has been discussed previously in Christie *et al* (2011) and Andrews (2009).

Graph 1

World Energy Consumption by Fuel*



* Oil includes crude oil and oil products; coal includes all coal types and peat; power includes electricity and heat plants, blast furnaces and energy industry use

Sources: International Energy Agency; RBA

uses (including heating and cooking). In recent decades, there has been strong growth in natural gas consumption in the Asia-Pacific region and the Middle East, although North America remains the largest gas consumer (Graph 2).³

Natural gas is the cleanest-burning fossil fuel, producing significantly lower carbon emissions than coal or oil, as well as lower levels of other pollutants (Table 1). As a result, natural gas has made up a large

3 A variety of measurement units are commonly used for natural gas and LNG. This article uses billions of cubic metres (bcm) except where otherwise indicated, consistent with the practice of the International Energy Agency. For conversion tables, see BP (2011).

Table 1: Energy Commodities – Global Reserves and Production^(a)

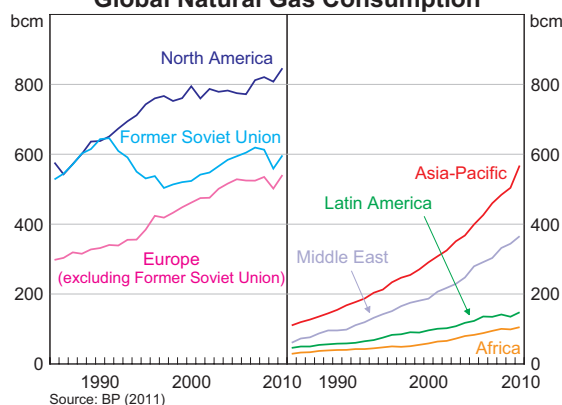
	Proven reserves 2010	Production 2010	Reserves to production ratio	Carbon emissions ^(b)
	Billion tonnes oil equivalent	Billion tonnes oil equivalent per year	Years	Grams CO ₂ per kilowatt hour
Natural gas	168	2.9	59	370
Crude oil	208	3.9	53	640
Coal	442	3.7	118	720–940

(a) Oil equivalence is based on average calorific value of different fuels. Proven reserves are those which, based on geological and engineering information, can be recovered in future with reasonable certainty based on current economic and operating conditions. Both conventional and unconventional sources of gas and oil are included in figures for production and proven reserves.

(b) Figures based on average emissions per kilowatt hour from power generation in OECD member countries over 2006 to 2008. Values are an approximation and should be interpreted with caution.

Sources: BP (2011); International Energy Agency

Graph 2
Global Natural Gas Consumption



portion of new electric power generation capacity in recent years, particularly in developed economies where it accounted for nearly three-quarters of capacity growth between 2000 and 2009. The shift toward gas power generation also reflects: lower capital outlays and shorter project lead times compared with coal and nuclear plants; flexibility in providing either peak or base load power or a supplement to intermittent renewable sources; and energy diversification policies.

Global ‘proven’ reserves of natural gas – that is, known deposits that can be recovered with reasonable certainty given current technology

and prices – represent around 60 years of current production (Table 1). Based on energy content, proven gas reserves are around 80 per cent of the size of oil reserves, but only 40 per cent the size of coal reserves.

Proven reserves of gas have increased gradually over time as a result of exploration and improved technology. In recent years, advances in drilling have meant that ‘unconventional’ reserves of gas have become more economic to extract. Unconventional reserves are found in rock formations through which gas does not flow easily so is more difficult to extract – these include coal seam gas, shale gas and tight gas. In Australia, conventional reserves are located primarily off the north-west coast, while significant coal seam gas reserves exist in the eastern coal basins.⁴

The world’s total recoverable reserves of gas are likely to be much larger than proven reserves, which are a relatively conservative measure requiring a high degree of certainty. While total recoverable reserves are difficult to measure, the International Energy Agency (IEA) estimates that they equate to around 120 years of current production for conventional deposits, and around 250 years of production including unconventional deposits (IEA 2011b).

⁴ See Geoscience Australia and ABARE (2010). While coal seam gas currently accounts for a small portion of Australia’s economic demonstrated reserves, total identified and potential coal seam reserves are substantially larger and may exceed conventional reserves.

Natural Gas Trade and the Role of LNG

As with other energy commodities, reserves of natural gas often do not lie near major centres of demand, resulting in international trade. Around 30 per cent of natural gas produced is internationally traded – much lower than for crude oil, which has around two-thirds of production traded, reflecting the greater difficulties in transporting gas (Graph 3). However, natural gas is traded more than coal, which had only around 15 per cent of production internationally traded in 2010.

There are two main technologies for transporting and trading natural gas:

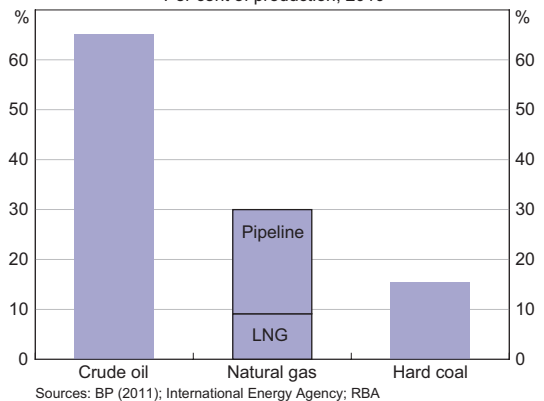
- pipelines, where gas is transmitted under high pressure through steel pipes; and
- LNG, where gas is cooled to a liquid at minus 160 degrees Celsius in large ‘trains’, reducing its volume by more than 600 times for transport in specialised tankers.

International pipeline trade is around twice the size of LNG trade. However, LNG is more economic than pipelines over long distances, particularly across oceans. Accordingly, it is used to bring production to market from remote or ‘stranded’ gas fields, provides traditional pipeline customers with alternative supply options from further afield, and is particularly useful in servicing coastal population centres. Reflecting this, LNG accounts for nearly three-quarters of long-distance natural gas trade.⁵

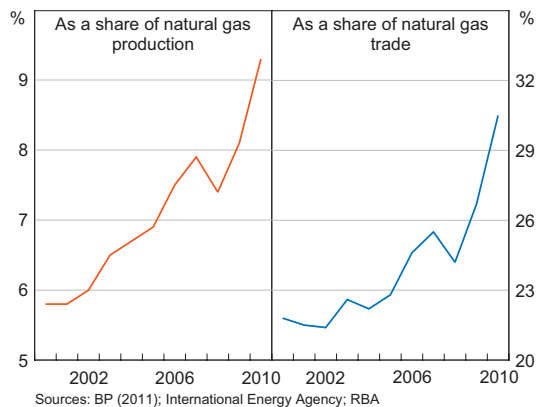
In recent years, LNG has risen substantially as a share of both gas production and trade (Graph 4). Since 2000, global LNG trade has more than doubled while pipeline trade has risen by only around one-third. In part, this reflected falling costs in the 1990s and early 2000s, as technical advances facilitated larger trains and transport tankers.⁶ This expansion in LNG trade has been underpinned by large capital investments

around the world, with further projects currently under way or being planned (see the section ‘Investment in New Capacity’). As investment has picked up in recent years, costs have risen as projects have competed for skilled labour, become more complex, and taken longer to complete.⁷

Graph 3
International Trade in Energy Commodities
Per cent of production, 2010



Graph 4
International Trade in LNG



5 Long-distance trade is defined as between continents or geographic regions.

6 The capital cost of LNG train capacity roughly halved between 1990 and 2004 (IEA 2005).

7 See Geoscience Australia and ABARE (2010) and IEA (2008, 2009).

The Structure of the LNG Market

While LNG links buyers with distant reserves, the global market is segmented between the two great ocean basins – the Atlantic and Pacific (Table 2). Because the Middle East is located between the two basins, it exports to both markets. The Asia-Pacific market is larger than the Atlantic market, accounting for a higher share of both imports and exports. However, its share of LNG trade has declined over time, as the Middle East has emerged as a major exporting region and a more diverse group of buyers has emerged in the Atlantic market.

Table 2: Composition of LNG Trade^(a)
Per cent of world trade, 2010

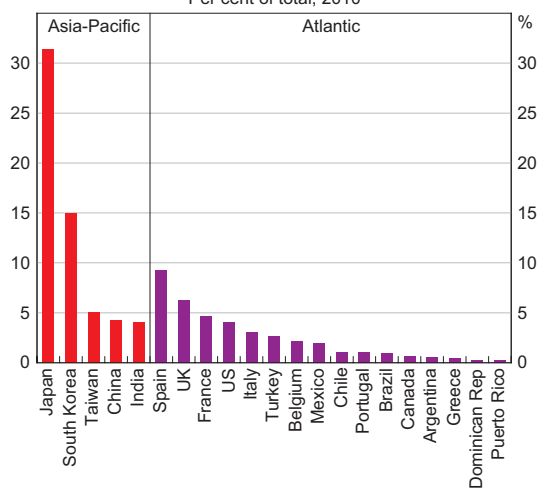
From:	To:		
	Asia-Pacific	Atlantic	Total
Asia-Pacific	36	1	37
Middle East	19	14	34
Atlantic	4	25	29
Total	60	40	100

(a) Asia-Pacific includes Asia, Australasia, Pacific and Russia; Atlantic includes North and South America, Africa, Europe (excluding Russia); Atlantic imports also include the Middle East

Source: BP (2011)

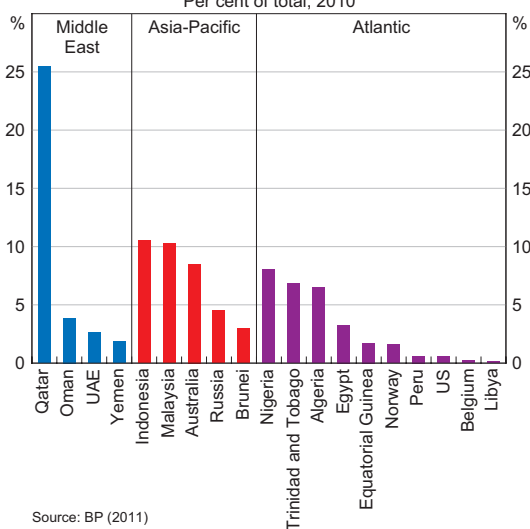
The LNG market developed significantly in the Asia-Pacific in the 1970s and 1980s. This was driven by the major industrial economies in the region at the time – Japan, Korea and Taiwan – seeking to diversify their energy supplies following the surge in oil prices between 1973 and 1980. These economies have little in the way of domestic gas reserves, and are not easily served by pipelines, so they have sought to import gas in the form of LNG. By 1990, Japan alone accounted for two-thirds of global imports, and although this share has since fallen, Japan remains the world’s largest importer of LNG by a wide margin (Graph 5). China and India have only recently begun importing LNG, receiving their first shipments in 2006 and 2004, respectively, and each accounts for a relatively small share of world imports. In the Atlantic, a wide group of buyers has developed, including a number of European nations looking to diversify supplies away from pipeline gas,

Graph 5
LNG Imports
Per cent of total, 2010



Source: BP (2011)

Graph 6
LNG Exports
Per cent of total, 2010



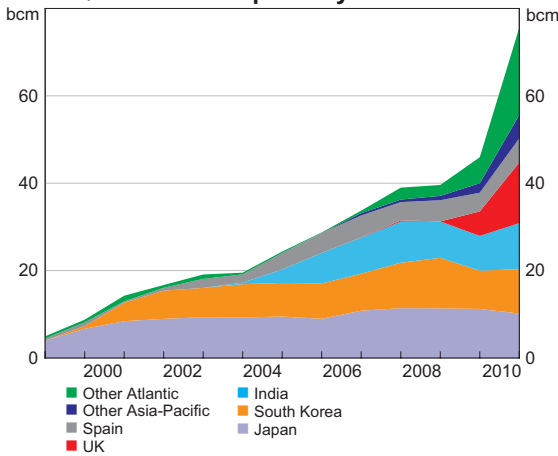
Source: BP (2011)

offset declines in local production and secure supply for expanded gas power generation.

Qatar is the world’s largest exporter of LNG, supplying around one-quarter of global exports in 2010 (Graph 6). By comparison, Saudi Arabia – the world’s largest crude oil exporter – supplies around 15 per cent of world crude oil exports (IEA 2011a). Qatar has recently completed a major expansion

Graph 7

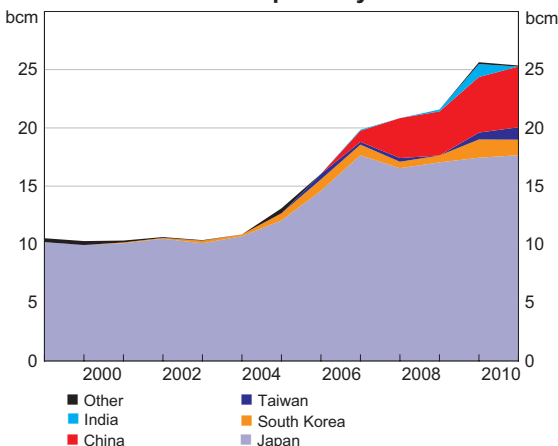
Qatar – LNG Exports by Destination



Sources: BP (2011); International Energy Agency

Graph 8

Australia – LNG Exports by Destination



Sources: BP (2011); International Energy Agency

program involving eight new trains and raising the country's export capacity five-fold since 2003, to 105 billion cubic metres (bcm) once the new trains have ramped up to full production. Historically, Qatar primarily served the Asia-Pacific market, but more recently Atlantic buyers have accounted for nearly half of Qatar's exports (Graph 7).

Australia is the fourth largest exporter of LNG, and is the only significant LNG exporter among OECD nations. Australia exports entirely to the Asia-Pacific

market, with Japan accounting for almost all of Australia's trade until the early 2000s (Graph 8). Since 2003, major investments have seen Australian exports increase two-and-a-half-fold (see Christie *et al* 2011), and China has emerged as a major destination. Volumes were also shipped to India for the first time in 2006.

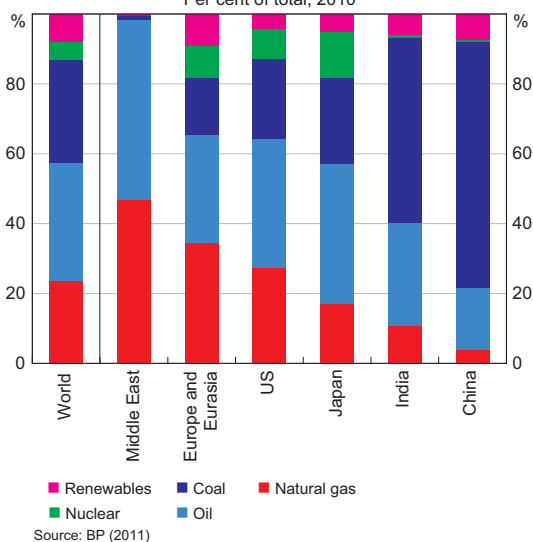
Investment in New Capacity

Rapid growth in LNG production capacity is likely to continue into the future, supported by large capital investments. LNG projects have very long horizons (supply contracts, discussed below, are often for around 20 to 25 years), and so are underpinned by expectations of long-term demand growth. According to the IEA (2010b, 2011b), consumption of natural gas is projected to increase by between 45 and 65 per cent from 2008 to 2035 under the IEA's different scenarios.⁸ Particular impetus for increased gas use may come from policy initiatives to reduce dependence on nuclear power following the Fukushima disaster, carbon reduction schemes and the development of unconventional gas.

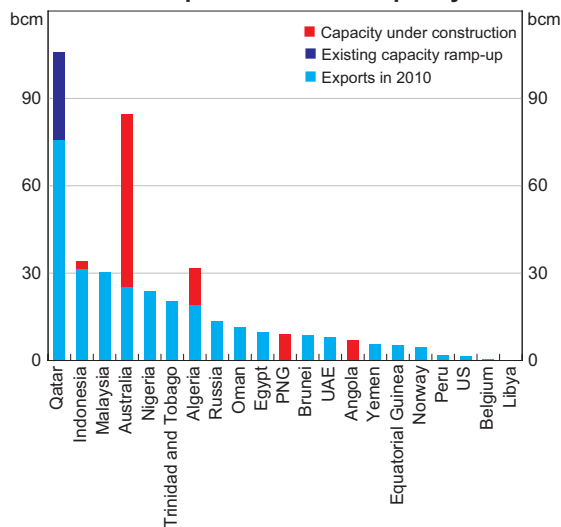
According to the IEA's projections, the vast bulk of the growth in gas demand is expected to come from non-OECD nations. Particularly rapid growth is expected from China and India, reflecting both increased energy demand and a rise in the share of energy derived from natural gas. In both countries, natural gas currently accounts for a relatively low portion of energy consumption (Graph 9). China has in place a policy objective to roughly double the energy share of natural gas to over 8 per cent by 2015 in order to improve energy efficiency and energy diversification. The use of gas is being promoted by a system of price regulation, and facilitated by major developments of gas supply infrastructure – including pipelines from gas fields in

⁸ Based on the following three IEA scenarios: current energy policies; incorporating broad energy policy commitments already made to address climate change and energy security; and including policy commitments but where gas plays a particularly prominent role in meeting future energy needs.

Graph 9
Primary Energy Consumption
Per cent of total, 2010



Graph 10
LNG Exports and New Capacity*



* Some new capacity will be offset by declines in output of existing capacity. Existing capacity ramp-up refers to completed facilities operating below potential capacity in 2010.
Sources: International Energy Agency; RBA

western China and nearby countries, as well as LNG import terminals.

In order to meet increased demand for LNG, significant capital investments are under way or in the planning stages around the world. These are at each level of the supply chain – including gas field development, LNG trains, tanker fleets and import terminals. LNG production and transport is highly capital intensive, so the scale of these investments tends to be very large. Investments in LNG production are largely undertaken by multinational oil and gas companies, in some cases alongside state controlled energy bodies (see IEA 2005).

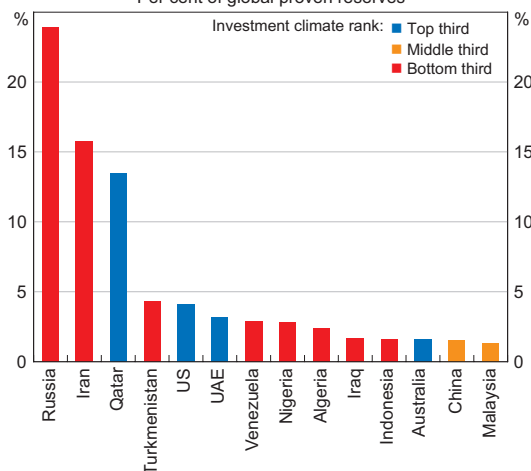
Australia has emerged as the major centre for investment in LNG production (Graph 10). New capacity equivalent to nearly one-third of global trade is currently under construction, of which around two-thirds is located in Australia.⁹ In contrast, Qatar has placed a moratorium on further development of the country's main gas field, reportedly to further assess the productive life of the reservoir (see IEA 2008). If the projects under way proceed as planned, Australia would become the world's second largest LNG exporter in the next few years.

Looking beyond the projects already committed, there is a large group of projects being evaluated around the world. The IEA notes that most of these projects that are likely to reach a final investment decision are based primarily in Australia (IEA 2011b). Those in other regions – particularly Iran, Nigeria and Russia – face greater headwinds including political uncertainty, limited access to LNG technology and large growth in domestic gas demand. While Australia's gas reserves are considerably smaller than these other regions, the nation's overall investment climate is rated as relatively favourable by executives of major petroleum corporations (Graph 11). Australia's proximity to Asia is also a key advantage, particularly given the very high costs of transporting LNG relative to most other commodities.¹⁰

9 Based on data from IEA (2011b), as well as Australian projects receiving final investment approval after the publication of IEA (2011b).

10 While Australia's proven reserves are smaller than other regions, unproven reserves are also significant. According to Geoscience Australia and ABARE (2010), overall gas reserves are sufficient to support a large increase in production.

Graph 11
Proven Gas Reserves and Investment Climate*
 Per cent of global proven reserves



* Country scores based on average across states or provinces; no rating available for Saudi Arabia, which has 4 per cent of global proven gas reserves
 Sources: BP (2011); Fraser Institute; RBA

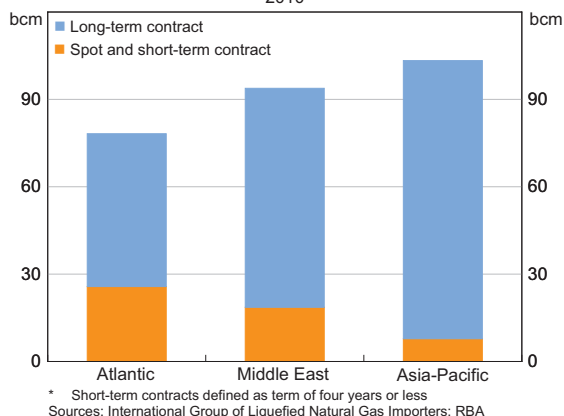
Contractual Arrangements and Pricing

The vast bulk of LNG trade is conducted under long-term supply contracts. Long-term contracts provide buyers with security of energy supply, and producers with certainty when making large scale, long-term investment decisions. Long-term contracts are particularly prevalent in the Asia-Pacific market, accounting for more than 90 per cent of the region's exports in 2010 (Graph 12). Historically, security of supply was particularly important for the traditional LNG importers in the Asia-Pacific – Japan, Korea and Taiwan – as these economies are almost entirely reliant upon LNG imports for their natural gas supply (Graph 13).

While still dominated by long-term contracts, there has been a gradual shift to more flexible arrangements as the LNG market has grown and become more diverse. Trade on a spot basis and under short-term contracts (of less than four years) has risen from around 5 per cent to 20 per cent of trade over the past decade.¹¹

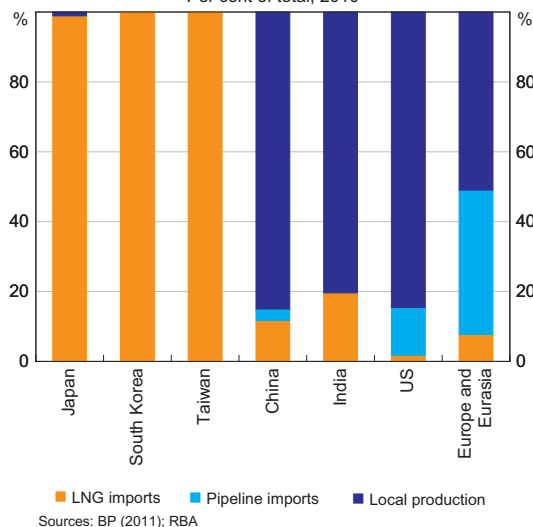
¹¹ According to GIIIGNL (2010) and IGU (2010).

Graph 12
LNG Exports by Contract Type*
 2010



* Short-term contracts defined as term of four years or less
 Sources: International Group of Liquefied Natural Gas Importers; RBA

Graph 13
Source of Natural Gas Consumed
 Per cent of total, 2010



Sources: BP (2011); RBA

In some cases, this reflects projects electing not to sell their entire output under contract in advance due to production uncertainty, and selling any above-contract output on the spot market. Spot and short-term trade has been relatively prevalent in the Atlantic market, accounting for one-third of trade in 2010. Among Atlantic importers, LNG is small relative

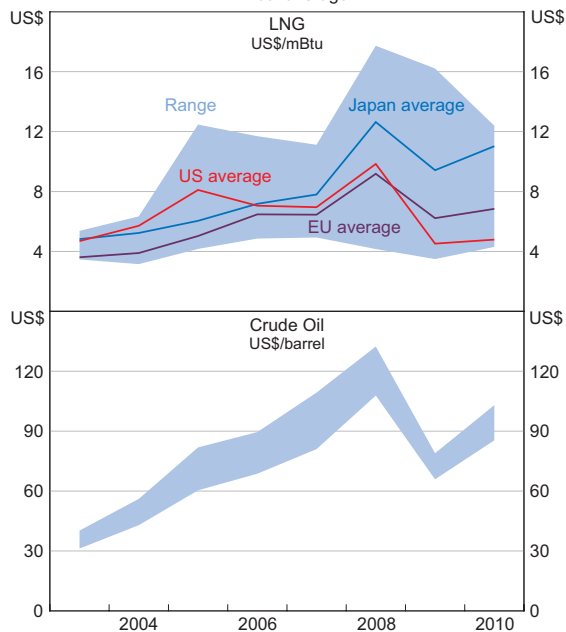
to pipeline trade and local gas production, and has to compete with these alternative gas supplies. Spot trade also accounts for a large portion of inter-basin LNG trade, with cargoes in recent years tending to flow from Atlantic producers to Asia-Pacific buyers.

Prices under long-term contracts are based on formulas linked to a reference rate – usually the lagged price of crude oil. Accordingly, the price per unit of LNG increases (decreases) when spot price of crude oil rises (falls), usually with a set lag of a few months. However, because these contracts are privately negotiated the exact formulas are not publicly available. Across Asia, LNG contract prices are typically linked to the Japan Customs-cleared Crude price (JCC). Historically, it has been common for contracts to have formulas that are non-linear, incorporating an ‘S-curve’ that moderates the impact of both high and low oil prices upon the LNG price.¹²

In contrast, spot LNG prices tend to track natural gas market fundamentals more closely. Spot prices are most easily observed at major gas trading hubs, where competing sources of gas (both pipeline and LNG) are priced. Of particular note are the Henry Hub in the southern United States, and the National Balancing Point in the United Kingdom (which is not actually a physical location). These hubs act as the pricing and delivery points for natural gas futures contracts.

Because of the diversity in pricing arrangements, the segmented nature of the global market, and differences in gas quality, prevailing LNG prices can vary significantly around the world (Graph 14). While only limited data are available, the highest reported LNG import price in 2010 was around three times the lowest reported price (on an annual average basis).¹³ In contrast, there is much less variation in crude oil prices across the world.

Graph 14
International LNG and Oil Prices*
Annual average



* Based on available prices only; sample of 20 to 30 prices per year for LNG, and 48 prices per year for crude oil; includes cost of freight and insurance
Sources: International Energy Agency; RBA

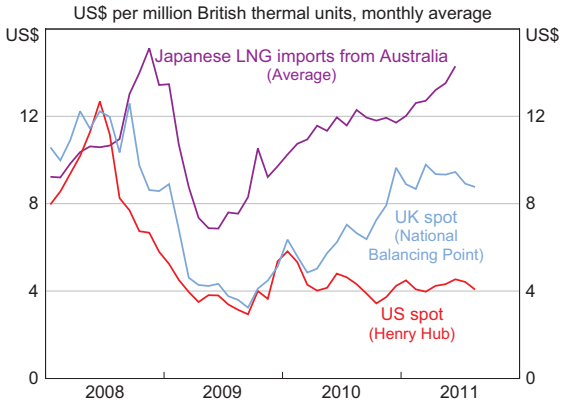
LNG prices have become more dispersed in recent years. This has been due primarily to different supply and demand developments across regions, and between the gas and oil markets. After falling during the global recession, oil-linked contract prices in the Asia-Pacific have risen as a result of higher oil prices; the average cost of Japanese LNG imports from Australia has doubled since its trough in 2009 (Graph 15).¹⁴ However, spot gas prices in the Atlantic have remained relatively subdued, particularly in North America, with the Henry Hub spot price having risen little since 2009. The low level of US spot prices has reflected large growth in unconventional gas production, as well as weak energy demand.

12 Jensen (2011) notes that S-curves have become less prevalent in recent years.

13 Jensen (2011) discusses arbitrage in the LNG market.

14 Around 97 per cent of Australian exports to Japan in 2010 were under long-term contracts, according to GILGNL (2010).

Graph 15
Natural Gas Prices*



* Cost of freight and insurance included in Japan import prices but not UK and US spot prices
Sources: Bloomberg; RBA

Risks to the Outlook

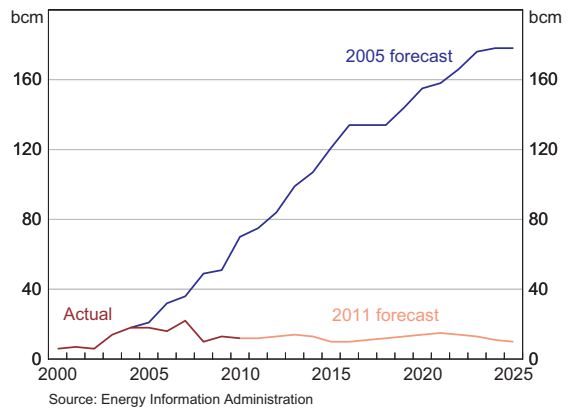
While large-scale investments in LNG are under way, these projects are subject to a number of risks, both prior to and after completion. These risks include competing sources of gas supply, escalating costs in the investment stage and changes in global oil prices.

Unconventional gas production has already had a considerable impact upon the US LNG market, and could further affect the global gas supply if developed more widely. In the United States, increased unconventional production has resulted in a large fall in expected LNG import demand, and been a major factor in the low level of US spot gas prices. Since 2005, shale gas has risen from 4 per cent to 23 per cent of US gas production, and is expected to reach one-third by the middle of the decade (EIA 2011a, 2011b). This has substantially altered the nation's supply-demand balance; the United States was previously expected to become a major LNG importer, as reflected in Energy Information Administration forecasts at the time (Graph 16). However, the nation is now largely gas self-sufficient and there are some proposals to export LNG, potentially to the Asia-Pacific market.

To date the development of unconventional gas has been primarily in the United States and Canada, but

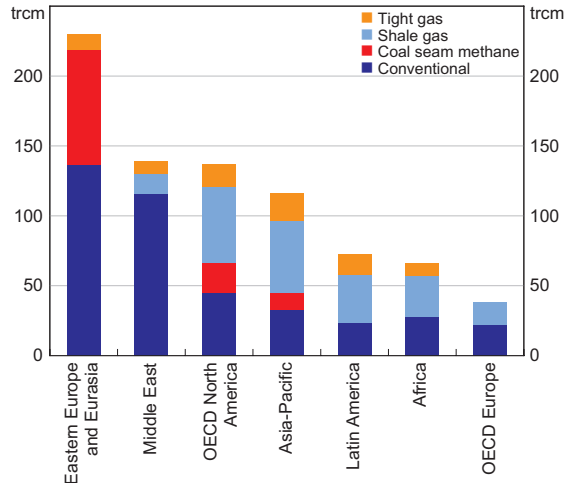
deposits are abundant around the world (Graph 17). A number of regions have taken steps in recent years to increase unconventional production, including some of Australia's major export markets (IEA 2010a). In China, large reserves of both shale and coal seam gas are believed to exist, and there have recently been various steps towards exploration and development of these reserves. Australia currently produces small volumes of unconventional natural gas, although projects under way in Queensland will see coal seam gas used to supply LNG for the first time.

Graph 16
United States – Forecast Net Imports of LNG



Source: Energy Information Administration

Graph 17
Estimated Remaining Recoverable Gas Reserves
Trillions of cubic metres



Source: International Energy Agency

While unconventional gas has the potential to provide a major source of new supply globally, possibly displacing some LNG imports, there are also barriers to its further development. The methods used to extract unconventional gas have come under scrutiny in recent years, particularly with regard to their potential impact on the environment. Concerns have been raised regarding the possible contamination of groundwater from the main technique used to extract unconventional gas, which involves fracturing rock deposits by pumping fluids under high pressure. In some cases around the world, the quality of gas is also thought to be low compared with the high-grade gas used to produce Australian LNG. Aside from environmental issues, it may also take some time to bring new production to market.

An additional risk to Asia-Pacific LNG producers is the potential for Qatar to redirect production. According to industry analysts, a significant volume of Qatar's LNG output could potentially be diverted from the Atlantic market to the Asia-Pacific market (see, for example, Wood Mackenzie (2011)). However, Qatar is reportedly seeking pricing terms that some Asia-Pacific buyers have to date been unwilling to accept.

While LNG investments face a variety of risks, the use of long-term contracts affords a significant degree of protection, particularly in terms of volumes. In

Australia, projects typically do not proceed until sales contracts are in place. Australia also remains a favoured contract partner owing to a low level of geopolitical risk. Thus, although the LNG market might look substantially different down the track, projects that are currently well advanced and can get product to market quickly will have an advantage in securing long-term supply contracts. Australian projects are well placed in this regard, as LNG investments have already progressed significantly with a number of projects receiving final investment approval in 2011, and more are expected over the period ahead.

Conclusion

Natural gas is a key source of energy for the world economy. An increasing share of natural gas is traded by way of LNG, which facilitates long-distance trade and brings gas from remote reserves to market. The LNG market is not as globalised as some other energy commodities, with trade segmented between regions and subject to a variety of pricing arrangements. Over coming decades, demand for LNG is expected to grow rapidly in the Asia-Pacific. In response, Australia has emerged as a major centre for LNG investment and is likely to become the second largest LNG supplier globally during the decade. As a result, developments in the LNG market have taken on increased importance for the Australian economy. ✎

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China's Labour Market

Anthony Rush*

This article discusses some of the key characteristics of China's labour market, including the role of the changing demographic structure, the nature and composition of employment, as well as the important role of the country's rural migrant workforce.

Introduction

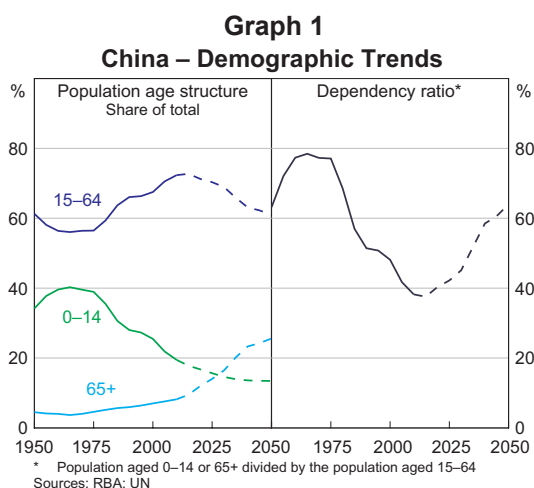
The reforms in China over the past 30 years have transformed the nature of employment in the world's most populous country. The 'iron-rice bowl', whereby urban workers were guaranteed a job in the state sector (state- and collective-owned enterprises), has been effectively dismantled, while other reforms have opened the economy and allowed rapid growth in a range of industries. These developments, as well as increased labour mobility, have resulted in a massive expansion in the employment of rural migrants – workers whose residence is rural but who typically move to the city for much of the year for employment opportunities. This has expanded the pool of labour available to China's construction and manufacturing sectors, amongst others, and helped China's economy to grow. This article discusses these developments, paying particular attention to: the nature of employment in China; the role of rural migrant workers; and some of the demographic challenges that China will confront over the coming decades.

Some Basic Demographic Facts

According to preliminary statistics from China's latest census, China's mainland population reached 1.34 billion people in 2010, with the population having grown at an annual average rate of 0.6 per cent over the past decade – down from 1.0 per cent over the previous decade. This slowing in the rate

of population growth is significant, and ongoing changes to the age structure in China will have important implications for China's labour market.

The working-age population (ages 15–64) increased to 74½ per cent of China's population in 2010 (from around 70 per cent in 2000), reflecting a significant reduction in the share of the population below the age of 15 (Graph 1). As a result, the dependency ratio (defined as the ratio of the population aged 0–14 or 65 and over to the working-age population) has declined to a very low level by international standards. United Nations (UN) projections of China's population suggest that the working-age population will peak within the next five years and subsequently will begin to shrink, while the dependency ratio is expected to rise rapidly as the population ages.¹



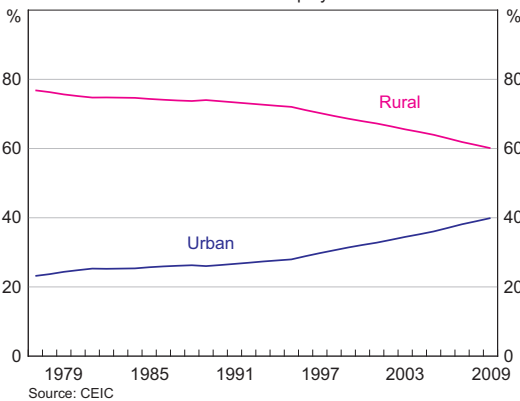
* The author is from Economic Group.

¹ See Hall and Stone (2010) for a detailed discussion of population trends in China.

One of the other significant ongoing changes in China has been the urbanisation of the population. Over the past decade, the share of the population living in an urban area increased by 13 percentage points to 50 per cent. In 2010, around 220 million people lived in a location different from that of their official household registration, an increase of over 80 per cent from 2000. As discussed later in this article, this reflects the rapid expansion in the number of rural migrant workers, with some estimates suggesting that there were as many as 100 million rural migrants living and working in urban centres during 2010.

There has also been a rapid shift towards urban employment, with the share of workers employed in urban areas increasing from just over 20 per cent in the late 1970s to 40 per cent by 2009 (Graph 2). The difference between the share of urban employment (40 per cent) and the urbanisation rate (50 per cent) is accounted for by different participation rates in rural and urban areas: although there is probably significant underemployment in rural areas, employment data suggest that just over 65 per cent of the rural population is employed compared with around 50 per cent in urban areas.

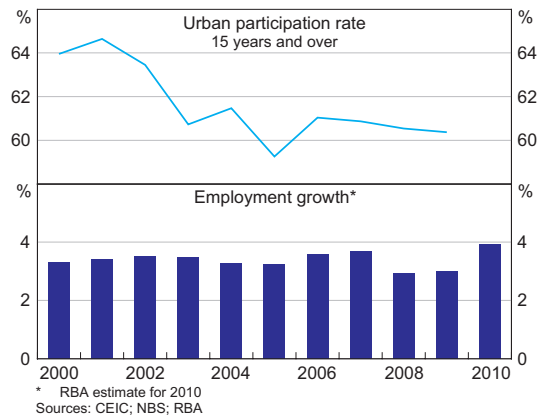
Graph 2
China – Employment
Share of total employment



The urban participation rate (including rural migrant workers) is currently estimated to be a little over 60 per cent and has fallen over the past 10 years

(Graph 3). There are a couple of potential reasons for this fall. The first is the rising enrolment rate in tertiary education; the number of new undergraduate enrolments increased six-fold between 1998 and 2009. The second is the relatively low retirement age in China, coupled with an increase in the share of the population between the ages of 50 and 64. Official retirement ages are 60 for males and 50–55 for females, and Knight, Quheng and Shi (2010) report that in 2002 the actual median retirement age was 59 for males and 51 for females. Notwithstanding the fall in the participation rate, urban employment growth has been rapid over the past decade reflecting the strong growth of the Chinese economy.

Graph 3
China – Urban Labour Force Indicators

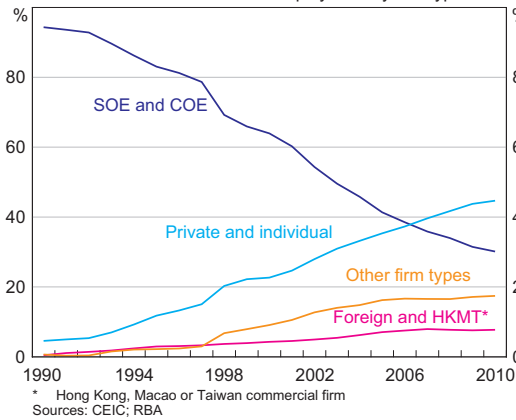


Employment Patterns

Economic reforms over the past three decades have seen a major shift in the ownership structure of employing firms (Graph 4). The share of urban employment attributed to state- and collective-owned enterprises (SOE and COE) has fallen from more than 90 per cent of employment in 1990 to 30 per cent in 2010.

By the early 1990s, it had become widely apparent that staffing levels in many SOEs were considerably above what was required. A survey in the mid 1990s by the National Bureau of Statistics of China (NBS) across 13 provincial capital cities suggested that 15 to 30 per cent of ‘employed’ workers in SOEs

Graph 4
China – Urban Employment by Firm Type
 As a share of total urban employment by firm type

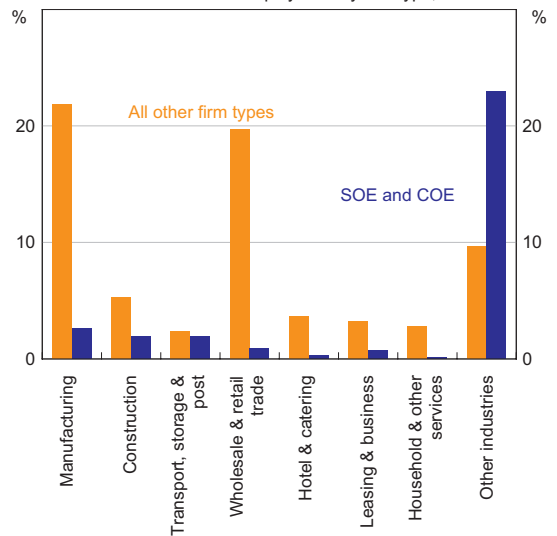


were effectively redundant (Kai 1995). By 1996, more than a third of SOEs were operating at a loss. To address overstaffing and low productivity in SOEs, the Chinese Government initiated a limited program of state-sector lay-offs in 1994 that was made national in 1997 (the *xiagang* reform). Under the *xiagang* reform, some laid-off workers were granted early retirement and early access to SOE pension schemes, while others were laid off with severance pay for a period of time, the size and duration of which depended on the worker's salary, years of service, the nature of their job and other working conditions. Between 1995 and 2002, the state-sector restructuring led to 36 million state-sector workers being laid off (Giles, Park and Zhang 2005), with employment in SOEs declining by a similar magnitude.

Over the past decade, employment growth in the 'non-state' sector has been very strong, with employment in these firms expanding by over 110 million persons.² The shift in employment away from SOEs and COEs to other firm types has been strongest in the eastern provinces.

² A portion of the growth in non-state sector employment could, however, be attributed to the reclassification of some SOEs as limited liability companies despite the government retaining control of these companies (OECD 2000, pp 17–18). Unfortunately, the official NBS data do not allow employment in 'other firms' to be split by state- and non-state ownership. For a discussion of ownership structure across different ownership types, see ADB (2002).

Graph 5
Employment by Industry
 Share of total urban employment by firm type, 2009



Employment in non-state firms is concentrated within a few key industries, with manufacturing and wholesale & retail trade each accounting for 20 per cent of urban firm employment (Graph 5). Employment in the state sector is skewed towards social services; about half of urban state-sector employees work in the education, health, social security & social welfare, and 'public management & social organisation' industries, while just over 5 per cent of state-sector employment is in the manufacturing sector.

Recent Trends in Wages

Data from the NBS suggest the average annual urban pre-tax wage was around CNY 30 000 in 2010 (which is equivalent to about A\$90–95 per week; Table 1). Despite widely publicised minimum wage freezes in 2009, average wages grew at an annual rate of 12 per cent between 2008 and 2010. The largest increases in wages were recorded in COEs, with wages in SOEs also increasing by more than average; non-state firms, which pay lower wages on average, increased wages by about 11 per cent per year over this period.

Table 1: Wages in China

	Nominal wages	Average annual growth
	CNY '000	Per cent
	2010	2008–2010
Average	29.8	11.7
By ownership		
SOE	39.5	12.8
COE	24.4	15.4
Non state- or collective-owned	26.2	11.0
<i>of which</i>		
Limited liability	33.1	12.1
Shareholding	46.0	14.1
Foreign-owned	40.2	10.9
HKMT	31.4	11.4
Private	20.8	10.3

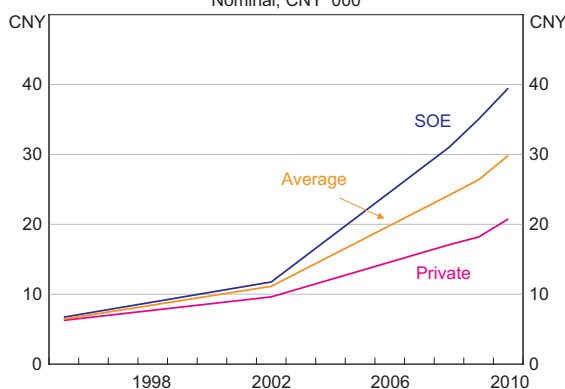
Sources: NBS; RBA

Wages for privately owned firms are currently around 30 per cent lower than the national average while wages paid by SOEs are about 30 per cent higher; this gap has widened over the past decade (Graph 6). Lower non-state sector wages do not seem to reflect employment patterns across regions, with data from official sources suggesting that the gap between state and non-state sector wages is broadly similar across provinces and also industries (Graph 7).

There are a number of possible explanations for the gap between state and non-state sector wages. Chen, Lu and Sato (2010) have argued that factors such

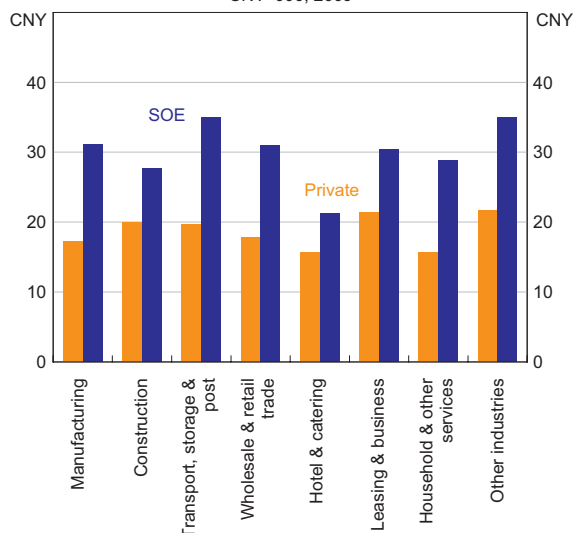
as Communist Party membership and household registration represent labour market barriers that generate wage differentials. A further possibility is that the wage gap is explained by differences in human capital or hours worked. However, Démurger, Shi and Yang (forthcoming) argue that the wage premium enjoyed by employees of state-owned firms cannot be entirely accounted for by these

Graph 6
China – Annual Average Wages by Ownership
Nominal, CNY '000*



* 1996–2001 and 2003–2007 interpolated
Sources: Chinese Household Income Project (1995 and 2002); NBS; RBA

Graph 7
China – Nominal Wages by Industry
CNY '000, 2009



Sources: NBS; RBA

factors. Another explanation is the potential role of rural migrant workers in driving wage differentials between the state and non-state sectors, and across industries.

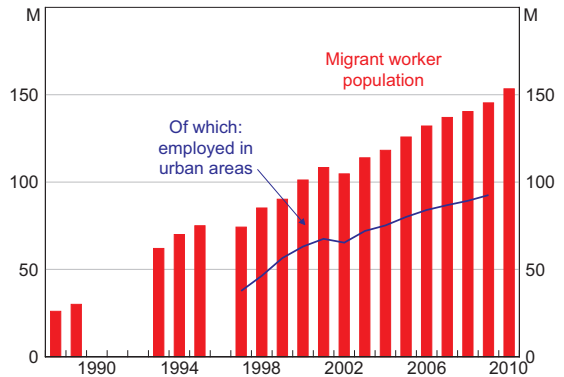
Rural–urban Migration

An important trend in China's labour market over the past few decades has been the rapid growth in the number of rural migrants working in urban enterprises (Graph 8). Prior to the late 1970s, the state's monopoly control of the distribution of living necessities and urban employment made it difficult for rural citizens to migrate to cities. The *hukou* system (or household registration system) classified people by their place of residence, and whether they were deemed to have 'rural' or 'urban' status. Under the food rationing system, a person was only eligible to receive staple foods if they remained in their local *hukou* area (Chan and Zhang 1999). While the food rationing system was subsequently abolished, the *hukou* system remains in place. In general, it is difficult for a person with rural household registration to migrate permanently and receive an urban household registration. Although labour mobility has improved over the past few decades, the *hukou* system still provides significant barriers to internal migration. In particular, since only those people who have local *hukou* registration are allowed to access most welfare services provided by the government, such as health care and education services, rural migrants are excluded from accessing these services.

Agricultural reforms that boosted farm productivity, combined with a baby boom in the 1950s and migration restrictions, led to significant surplus labour in rural areas by the 1980s (Li, Liu and Zhang 2003). The initial response of the Chinese Government was to encourage the development of rural industry through township and village enterprises (TVEs). By the end of the 1980s, around 95 million workers were employed in TVEs.

In 1985, the Ministry of Public Security introduced a new system of temporary residency for people outside their place of *hukou* registration. The change

Graph 8
China – Number of Rural Migrant Workers*



* The red columns refer to all rural migrants without local 'hukou' where they are living; the blue line by Herd, Koen and Reuterswald (2010) calculates the level of rural–urban migrant employment, RBA estimate for 2009 number following their methodology
Sources: Chan (forthcoming) for 1988, 1989, 1993–1995 data; MOLSS (2002) and RBA for 1997–1999 data; Herd *et al* (2010) for all 2000–2008 data; NBS (2010) and RBA for 2009 data; MOLSS (2011) for 2010 data

promoted the internal migration of rural workers, whereas the previous policy required work by rural labourers in cities to be formally pre-arranged (Chan and Zhang 1999). The change of policy resulted in a rapid expansion in the migration of rural workers to urban centres – by 1989, the number of rural migrant workers was estimated to have reached 30 million, up from only 2 million in the early 1980s.

A further impetus to migration came from Deng Xiaoping's southern inspection tour in 1992, which precipitated a wave of investment and development in China that, in turn, led to rapid growth in the demand for labour in the southern coastal areas. Combined with the development of the private sector, the dismantling of the food rationing system from the mid 1980s and the relaxation of restrictions on internal migration, this helped to encourage rapid growth in the number of rural migrant workers – by 1993, the number of rural migrant workers had reached over 60 million. However, the lay-offs precipitated by the *xiagang* reform led to the emergence of urban unemployment by the late 1990s, causing some local governments to impose regulations to restrict rural migration (Zhan 2005). Coupled with the effects of the Asian financial crisis, migration slowed in the mid to late 1990s.

Rural–urban migration expanded again through the 2000s as the opening of China’s economy was accelerated following its accession to the World Trade Organization in 2001. Overall, the economic reforms that began in the late 1970s and the relaxation of certain aspects of the *hukou* system greatly increased the migration of labour from rural to urban areas; there has been a rough doubling in the number of rural migrant workers over the decade to its current level of just over 150 million.

In 2010, there were a little over 240 million people with a rural *hukou* not working in agriculture, equivalent to about 30 per cent of the country’s labour force. A little over 60 per cent of these workers had migrated, with the remainder staying in their local area – for example, to work for a TVE. Of the rural migrants, around half have migrated to another province. Comprehensive data on inter-provincial migrant worker flows for the period 2000–2005 suggest that the source provinces of inter-provincial migrants are concentrated in the centre and south-west of China – particularly Sichuan and Anhui (Figure 1) – while roughly half of inter-provincial migrants move to the coastal provinces of Guangdong and Zhejiang – where a large

amount of manufacturing activity occurs (Figure 2). Given the strong demand for labour along the coastal provinces, rural migrants from eastern provinces are less likely to migrate to another province. NBS data for 2009 suggest that migrants from eastern provinces are about four times as likely to migrate within their home province as to migrate to another province. On the other hand, migrants from the central and western provinces are more likely to migrate to another province than stay in their home province.

While the eastern provinces are still the major destination for migrant workers, there appears to have been a shift in migrant labour away from these coastal regions between 2008 and 2009. This shift is most evident in the Pearl and Yangtze River Delta areas, which absorbed 52 per cent of all migrant labour in 2008, but only 42 per cent in 2009. This was partly due to the economic effects of the global financial crisis deterring migration towards the coast, but it could also reflect the gradual shift in economic activity towards the central and western provinces as central government policies increasingly focus on developing these regions further.

Figure 1 Rural–urban Migration: Source Provinces 2000–2005
Total outward migration by province, share of total inter-provincial outward migration

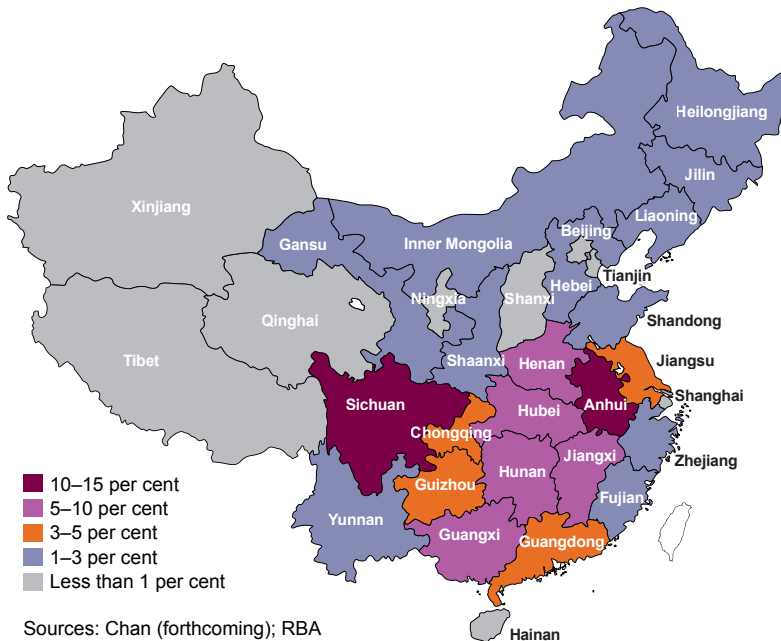
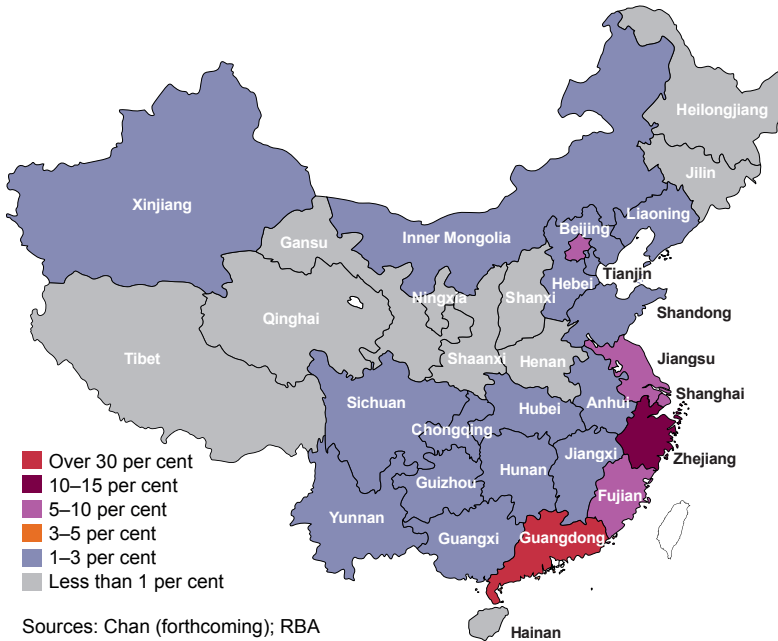


Figure 2 Rural–urban Migration: Destination Provinces 2000–2005
Total inward migration by province, share of total inter-provincial inward migration

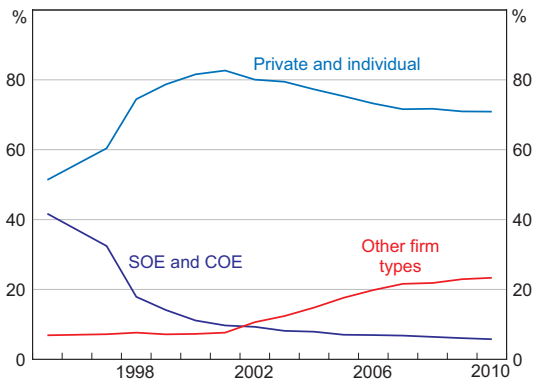


Reflecting the large share of rural migrants in coastal provinces, it appears that migrant workers are predominantly employed by the non-state sector and, in particular, by the manufacturing industry (Graphs 9 and 10). Nearly 70 per cent of migrant workers are employed in ‘private and individual’ firms, although this share appears to have declined over the past 10 years. Currently, rural migrants are estimated to account for a little over half of urban employment in private and individual firms.

Given that migrant workers constitute a far larger share of non-state sector employment than of state sector employment, it seems plausible that rural–urban migration might be playing a role in driving the wage differentials between these sectors noted earlier. Wages for migrant workers tend to be a lot lower than average urban wages. In 2009, the average migrant earned about CNY 1700 per month for those months that they worked (equivalent to around A\$60 a week; Graph 11).³ These workers

³ However, in 2009 around 50 per cent of rural migrants received free accommodation from their employers. Free or subsidised accommodation is not captured in the wages data, potentially understating the true level of remuneration to migrant workers.

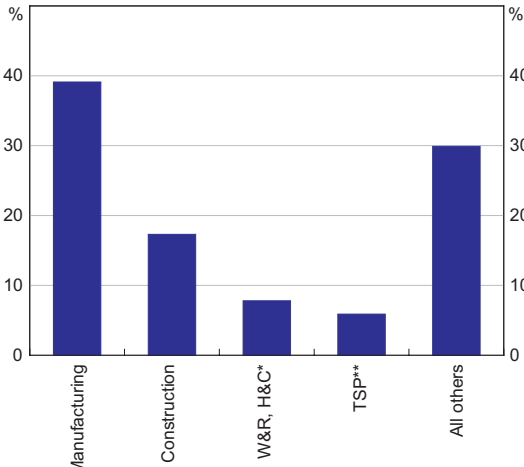
Graph 9
China – Rural–urban Migrant Employment
Share of estimated rural–urban migrant employment*



* Rural–urban migrant employment is based upon estimates of the number of rural–urban migrants in urban areas for at least six months in the year; estimates for 2008–2010
Sources: Chan (forthcoming); Herd *et al* (2010); Ministry of Labor and Social Security (MOLSS); NBS; RBA; Song and Yu (2005)

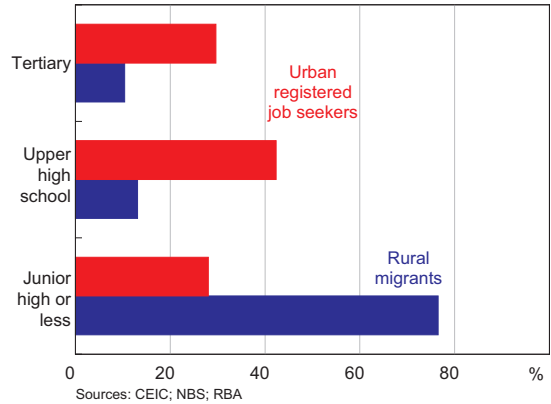
typically spend a portion of the year in their home towns and villages. They also typically work long hours; the average migrant worked 58½ hours a week in 2009, compared with the urban average of a little less than 45 hours a week in November 2009.

Graph 10
Migrant Workers – Employment by Industry
 Share of total

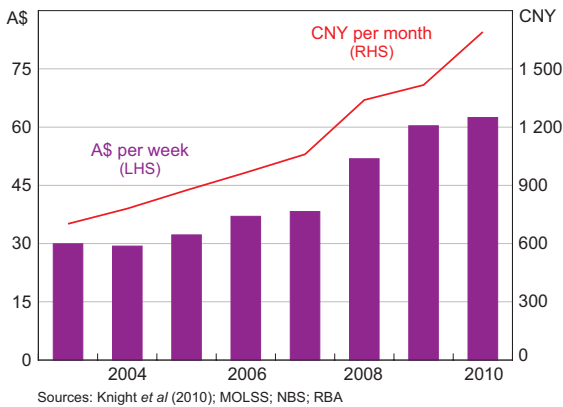


* 'Wholesale & retail' & 'hotel & catering' industries
 ** 'Transport, storage & post' industry
 Source: NBS

Graph 12
Educational Attainment
 2009 proportions



Graph 11
Average Migrant Worker Earnings
 Nominal



The Effect of Demographic Change on China and Surplus Rural Labour

According to the 2010 revision of the UN's *World Population Prospects*, the working-age population in China is expected to peak in the next five years or so and shrink by 20 per cent by 2050, under the UN's central fertility assumptions. The effects of such a demographic shift on the labour force may, however, be partly offset by an increase in the participation rate through later retirements. With fewer children to help support parents in their retirement and limited financial support from public pensions, it would not be surprising if there was a trend for workers to retire later. The effect on the urban labour market may also be offset by a further expansion in the number of rural migrant workers in coming years. However, there is much debate as to how much rural 'surplus' labour remains.

One reason for the relatively lower wages of migrant workers is that they typically have lower levels of education (Graph 12). In 2009, less than one quarter of migrants had completed high school and only 10 per cent had tertiary qualifications of any kind. By comparison, 70 per cent of registered urban job seekers had completed high school, with 30 per cent having earned a tertiary qualification.

Some contend that China is close to exhausting its surplus of rural labour. Such arguments are often predicated on reports of rapid wage increases in recent years for migrant workers, which could signal a tightening of rural labour supply.⁴ While there have been media reports of migrant worker shortages in coastal urban areas since at least 2003, the frequency of such reports appears to have increased recently.

⁴ Other arguments have been made; see Golley and Meng (forthcoming) for a synopsis.

Others have argued that China still has a large stock of surplus rural labour. Using detailed survey data, Golley and Meng (forthcoming) show that over the past decade wages for rural migrant workers have grown at half the rate of wages for workers with an urban *hukou*, suggesting that factors such as experience, the level of education and living costs could explain increases in normal migrant worker wages. Furthermore, Knight *et al* (2010) argue that institutional factors, particularly those that prevent rural migrants from accessing most welfare services provided by the Government, deter migration, and consequently there remains a large pool of potential migrant workers. Consequently, these authors claim that despite a dramatic increase in migration over the past two decades, the number of rural migrants could increase further. Using alternative sets of assumptions, both Knight *et al* (2010) and Golley and Meng (forthcoming) suggest that an increase of roughly 150 million migrants by 2020 – that is, a doubling of the current level – is possible. ✂

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The Domestic Market for Short-term Debt Securities

Matthew Boge and Ian Wilson*

The market for short-term debt is dominated by the issuance of bank securities. Yields on these securities act as an important reference rate within the financial system. The turmoil in global markets during recent years has led to significant changes in the short-term debt market as the funding profiles of banks and other issuers of short-term securities has altered.

Introduction

Short-term debt securities are those issued with less than 12 months to maturity. They play an important role within the domestic financial system, both as a source of liquidity for the banking sector and as a pricing benchmark for a wide range of contractual obligations. This article considers how the composition of the short-term debt market has altered in recent years and how prospective regulatory initiatives may bring about further changes. The main developments that have occurred are a significant shift in the pattern of bank funding, a reduction in issuance by securitisation vehicles and the reintroduction of Treasury notes by the Australian Government.

Banks' Issuance

Within the Australian market, the banking sector is the predominant issuer of short-term debt securities, through the sale of certificates of deposit (CDs) and bank accepted bills (Table 1).

Bill facilities are an important means by which banks extend credit to businesses. By 'accepting' a bill of exchange drawn by one of its customers, the bank extends credit to the customer and guarantees repayment at maturity to the holder of the bill. Bill acceptances account for around 20 per cent of bank lending to business and, as with overall business credit, acceptances have fallen since early 2009 (Graph 1).

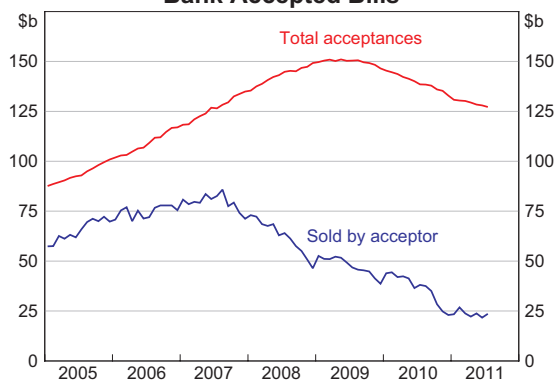
Table 1: Short-term Debt Securities Outstanding Domestically Issued

	As at 30 June 2011		As at 30 June 2007	
	\$b	% of total	\$b	% of total
<i>Issued by:</i>				
Banks				
as bank accepted bills	21.7	8.7	81.1	24.8
as CDs	180.9	72.2	181.1	55.4
AOFM (as Treasury notes)	16.0	6.4	0.0	0.0
State and territory government authorities (semi-governments)	12.0	4.8	6.1	1.9
Securitisers (as asset-backed commercial paper)	13.8	5.5	25.2	7.7
Other corporations	6.2	2.5	33.6	10.3
Total	250.6	100.0	327.1	100.0

Sources: ABS; AOFM; APRA; Austraclear

* The authors are from Domestic Markets Department.

Graph 1
Bank Accepted Bills



Source: APRA

To fund the extension of credit made to the drawer of a bill, the bank may sell the acceptance into the market. However, in recent years, banks have increasingly preferred to retain most of their acceptances within their own portfolios, such that the outstanding stock of bills sold to investors is now less than \$25 billion, compared with \$128 billion of total acceptances.

While bill facilities tend to function as revolving lines of credit, customers generally draw bills with quite short maturities, such as one month. In the expectation that further credit is likely to be extended at the bill's maturity, banks prefer to fund themselves at longer maturities than the bills that they have accepted. Reflecting this, most short-term debt securities issued by banks now tend to be certificates of deposit (Graph 2).¹ As at June 2011, there was \$181 billion in bank CDs outstanding.

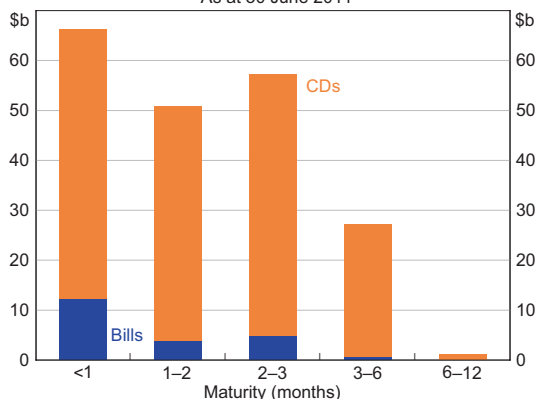
Since 2004, bank bills and CDs issued by authorised deposit-taking institutions (ADIs) have been eligible for sale under repurchase agreement (repo) to the Reserve Bank in its market operations, as a means of providing liquidity to the owner of the securities. The

1 Several ADIs issue CDs with terms to maturity exceeding 12 months. These CDs are not included in the analysis or data presented here. Long-term CDs (such as 'transferable' CDs) often pay regular coupons, whereas all the securities discussed in this article are zero-coupon (or discount) instruments. Unlike deposits, CDs (of whatever maturity) are not 'protected accounts' under the *Banking Act 1959*, and are therefore not covered by the Financial Claims Scheme.

Graph 2

Bills and Short-term CDs Issued by Banks

As at 30 June 2011



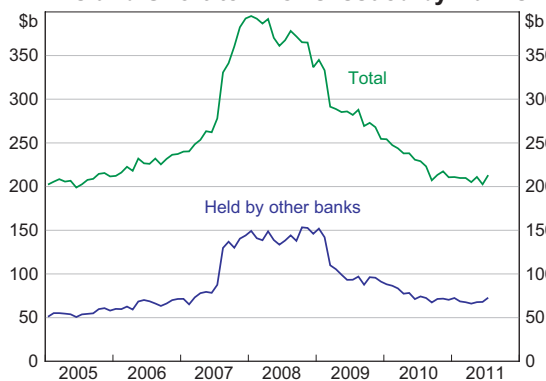
Sources: Austraclear; RBA

Reserve Bank does not purchase these securities on an outright basis and repos are only contracted with counterparties that are not related to the issuer of the security.² As securities that are eligible for sale to the Reserve Bank count as liquid assets under APRA's prudential liquidity requirements, ADIs have been able to hold other entities' bills and CDs in fulfilment of these requirements. At present, around one-third of the bills and CDs sold into the market are held by other ADIs (Graph 3).

The importance of bill and CD holdings as a source of liquidity was highlighted by the banks' response to the emerging financial crisis in mid 2007. Issuance of CDs rose sharply, with most new securities issued to other ADIs. This gave ADIs greater scope to source liquidity from the Reserve Bank, were it to be needed. However, when the financial crisis reached its peak after the collapse of Lehman Brothers in late 2008, ADIs were permitted to securitise residential mortgages they held on their books and sell these 'internal securitisations' to the Bank under repo. These arrangements – which remained in place until mid 2009 – lessened the need for cross-holdings of CDs and issuance of those securities consequently declined.³

2 A repo is an agreement between two parties under which one party sells a security to the other, with a commitment to buy back the security at a later date for a specified price.

3 While internal securitisations remain eligible for the Reserve Bank's market operations, since mid 2009, the Bank has only been willing to purchase these securities under repo in 'extraordinary' circumstances.

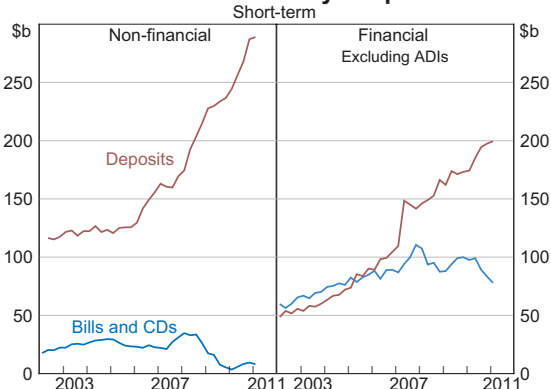
Graph 3**Bills and Short-term CDs Issued by Banks**

Source: APRA

Since that time, CD issuance has continued to fall. To some extent, this reflects the efforts that ADIs have made toward extending the maturity of their liabilities by issuing more longer-term debt securities. However, the main adjustment in bank funding has been a switch from short-term securities to deposits of similar maturity.

Several factors appear to have driven this change, on both the demand and supply sides. Firstly, the role of cash management trusts within the financial system has declined, particularly since the Australian Government introduced a guarantee on deposits (of up to \$1 million) in late 2008. These trusts were significant investors in CDs.

Secondly, the financial market turmoil of recent years has resulted in market participants viewing deposits as a more stable source of funding than negotiable instruments. To a certain extent, this is consistent with the proposed Basel III liquidity reform measures. Under Basel III, ADIs will face more stringent liquidity regulations than at present, requiring them to hold liquid assets against their projected net cash outflows in a 30-day stress scenario. In that scenario, certain deposits (such as those placed by retail and non-financial corporate customers) are assumed to 'run-off' at a slower rate than maturing securities. In response, to reorient their funding base along these lines, ADIs have been prepared to pay a higher premium for deposit funding, increasing the

Graph 4**Bank Liabilities Held by Corporations**

Sources: ABS; APRA

rates they pay on deposits relative to those paid on bills and CDs. As a consequence, non-financial corporations have reduced their purchases of short-term securities and increased their placements of deposits (Graph 4, left-hand panel). Similarly, financial entities (such as pension funds) are now also much more likely to place deposits with ADIs than purchase negotiable instruments such as CDs. (Under Basel III, however, deposits from those sources are assumed to run-off at the same rate as maturing securities.)

Going forward, other aspects of the Basel III measures may also affect the market for bills and CDs. The requirement to hold liquid assets against all securities maturing within 30 days may remove the incentive for ADIs to issue any debt securities with less than 31 days to maturity. Additionally, only cash, balances held at the Reserve Bank, Commonwealth Government securities (CGS) and securities issued by the state and territory central borrowing authorities will qualify as liquid assets in the Australian market. Holdings of certain private securities – such as bills and CDs – may still count toward an ADI's liquidity requirement, but only if the ADI has paid a fee to ensure access to the Reserve Bank's committed liquidity facility.⁴

⁴ The Reserve Bank's proposed committed liquidity facility will permit ADIs to sell eligible securities to the Bank under repurchase agreement. The eligible securities will correspond to those deemed eligible for the Bank's market operations.

Trading in Bank Bills and CDs

Within the market for bank bills and CDs, a distinction is drawn between ‘prime’ and ‘non-prime’ banks. The determination of prime banks is overseen by the Australian Financial Markets Association (AFMA) through an annual selection process conducted amongst money-market participants. Prime banks need to be of a high credit quality and with a sufficiently large issuance program so as to promote liquidity. Currently, there are six prime banks: ANZ, BNP Paribas, CBA, JPM Chase, NAB and WBC. These banks all have long-term debt ratings of AA- or better and, at close to \$150 billion, their bill and CD issuance accounts for around 70 per cent of the market.⁵ As much as one-third of prime bank issuance is likely to be held within the interbank market.

The purpose of designating certain banks as ‘prime’ is to create a homogenous group of liquid securities. Within the interbank market, most of the trading in prime bank bills and CDs is conducted via brokers. When posting bids and offers, buyers and sellers do not specify a particular bank; they are simply dealing in prime bank debt. A buyer is presumed to be indifferent between receiving bills or CDs issued by any of the prime banks.⁶

To promote liquidity in the market further, securities are grouped into maturity buckets corresponding to the first and second half of each month (‘early’ and ‘late’ securities). Thus, an investor looking to purchase three-month bills or CDs on the 1st of September would be bidding for early December paper and, if successful, could receive any bill or CD issued by a prime bank maturing between the 1st and the 15th of December. This feature naturally influences the pricing of bank bills and CDs. When bidding, the buyer will assume that the seller will deliver the security that it is most in the seller’s interest to

deliver. For example, when the yield curve is upward sloping, for a given rate the seller would rather deliver a longer maturity security. In this environment, bills and CDs maturing in, say, the first half of the month, will be priced as though they mature on the 15th.

Interest rates on prime bank bills and CDs act as key reference rates in the domestic market, not just as a pricing benchmark for other short-term debt securities, but also for determining the payment obligations due on long-term floating rate debt and on a range of derivatives, such as interest-rate swaps, cross-currency swaps and forward-rate agreements. The specific reference rates used are known as bank bill swap reference rates (BBSW) and their compilation is overseen by AFMA. Each trading day, AFMA surveys market participants for rates on prime bank bills and CDs for maturities ranging from one to six months.⁷ Survey respondents report where these securities are trading in the market at 10 am.⁸ This method is very different to that used by the British Bankers’ Association when deriving LIBOR (see Box A).

As BBSW is set at 10 am, most of the trading activity in bills and CDs tends to occur at this time. Liquidity is generally greatest at the three-month maturity, with between \$0.5 billion and \$1 billion in securities turning over most days in the interbank market. Trading tends to be particularly active towards the end of each half-month period. As the liquidity of a three-month bill or CD declines noticeably when its maturity effectively drops to two-and-a-half months, market participants may look to close out their trading positions ahead of that time.

5 Excepting JPM Chase, bills and CDs issued by the prime banks are those able to be delivered in settlement of a position in the Sydney Futures Exchange’s (SFE) 90-day bank bill futures contract.

6 Although market convention permits a buyer to reject a trade within 10 minutes of execution if they lack sufficient credit limit for the name offered, it is extremely rare for buyers to exercise this option.

7 Prior to 2009, AFMA also calculated 9- and 12-month BBSW. However, the contraction of issuance at these maturities during the financial crisis prompted AFMA to discontinue their calculations.

8 AMFA also conducts an end-of-day rate set for prime bank bills and CDs. While the process is identical to that used for BBSW, these 4.30 pm rates are generally only used for mark-to-market purposes and do not have the profile of the earlier rate set. Reflecting this, end-of-day trading is considerably less active than at 10 am.

Box A

LIBOR

Each trading day, the British Bankers' Association (BBA) publishes interbank borrowing rates in the London market for 10 currencies, including the Australian dollar. These rates are known as London Interbank Offer Rates (LIBOR).

Respondents to the BBA's survey report where their institution has borrowed, or potentially could borrow, in the unsecured interbank market for maturities ranging from overnight to 12 months. The BBA's calculations are therefore reliant on the respondents reporting accurate data about their own (actual or potential) borrowings. Partly reflecting the disparate credit standings of the respondents, there can be a reasonably wide variation amongst the contributions. This contrasts with BBSW, where respondents report the current trading levels of other institutions' debt, most of which is occurring transparently over brokers' screens. Consequently, there is almost always a high degree of correspondence between the individual contributions to the BBSW survey.

In recent times, there have been concerns expressed about the reliability and integrity of the LIBOR fixings.¹ During the period of turmoil in global markets in 2008 and 2009, unsecured interbank lending for all but the shortest maturities was significantly curtailed in many currencies. As a consequence, many respondents may have been reporting rates that did not correspond to any actual (or even potential) borrowings. As to whether contributing banks could have submitted rates purposefully

designed to influence the LIBOR fixings in a manner beneficial to their firm (perhaps because they held derivative or other positions whose payoffs were linked to the LIBOR fix), the BBA stress that for each rate, the ranked responses are trimmed of their top and bottom quartiles and then averaged to produce the LIBOR fixing. In the Australian context, to manipulate the BBSW rate set, an institution would need to manipulate the traded market directly.

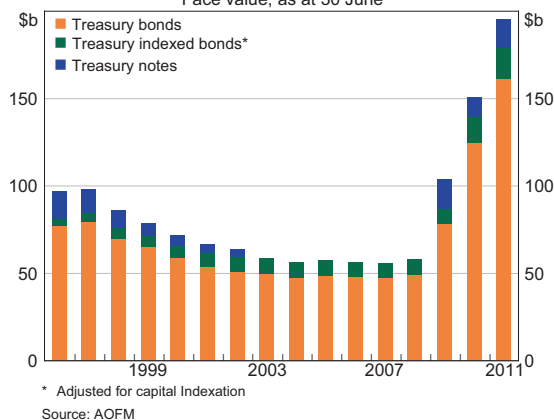
Australian dollar rates are provided to the BBA by eight banks who operate in the London market for Australian dollars. Unsecured borrowings in this market are generally quite limited, however. Much of the offshore interbank borrowing and lending of Australian dollars takes place via foreign exchange swaps, whereby funds are exchanged against another currency (usually, US dollars) with an agreement to unwind the exchange at a future date. In this way, Australian entities that raise short-term funds offshore (such as ADIs and the states' central borrowing authorities) generally borrow in a foreign currency and swap the proceeds back into Australian dollars. Reflecting this, while LIBOR fixings are used as the principal reference rates in currencies such as the British pound, the Swiss franc and the US dollar, Australian dollar LIBOR does not have a comparable status. Rather, BBSW is used as the interbank reference rate for most Australian dollar derivatives and other financial instruments.

¹ For a discussion, see Gyntelberg and Wooldridge (2008).

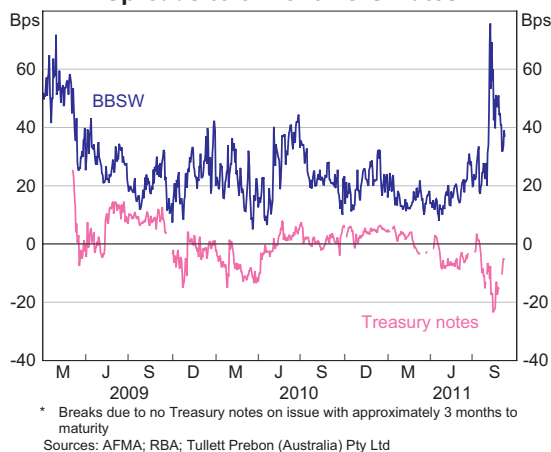
Government Securities

In March 2009, the Australian Office of Financial Management (AOFM) recommenced the issuance of Treasury notes on behalf of the Australian Government, more than five years after all previously issued notes had matured (Graph 5). Treasury notes are short-term CGS and are principally used to smooth the intra-year variation in the Government’s financial position. Accordingly, the volume on issue can fluctuate appreciably. In the 2010/11 year, for example, Treasury notes outstanding ranged between \$10 billion and \$20 billion.

Graph 5
CGS on Issue
Face value; as at 30 June



Graph 6
Spreads to 3-month OIS Rates



In the decade or so before 2008/09, consistent budget surpluses meant that the Australian Government accumulated significant financial assets (principally, deposits at the Reserve Bank). Instead of issuing Treasury notes, asset holdings were allowed to rise and fall so as to offset the short-term fluctuations in the Government’s financial position arising from the intra-year cycles in receipts and payments. Unlike the role played by Treasury bonds in the longer-term debt market, Treasury notes are not the principal reference rate within the money market. As noted above, that function is performed by interbank rates (namely, BBSW), as it is in most overseas markets. Hence, while successive Governments have committed to maintaining a sufficient supply of Treasury bonds in order to provide a ‘risk-free’ curve for long-term interest rates, the supply of Treasury notes has been allowed to vary (and even cease) as the Government’s financial position has varied.

At present, Treasury notes are generally offered at tender once per week. Investor appetite was somewhat variable when Treasury notes were initially reintroduced, but, consistent with their risk-free status, yields on these securities are now generally well below other short-term interest rates (Graph 6), with strong demand from offshore investors such as foreign central banks. To aid liquidity in these instruments, the AOFM now structures its issuance toward having large individual notes, with no more than one note maturing in any half-month period.

The central borrowing authorities of the states and territories also issue short-term debt securities.⁹ Most ‘semi-government’ authorities appoint a panel of dealers through which they sell their notes and/or commercial paper. While some authorities tender set amounts, others sell via ‘reverse enquiry’; that is, they respond to indications of demand that the dealers have received from their investor clients. Reflecting the benchmark status of prime bank bills and CDs, rates on semi-government short-term debt

9 For more details on the debt programs of the central borrowing authorities, see Lancaster and Dowling (2011).

securities tend to be set at a margin to BBSW, with the spreads below BBSW tending to be somewhat less than those implied by Treasury note yields.

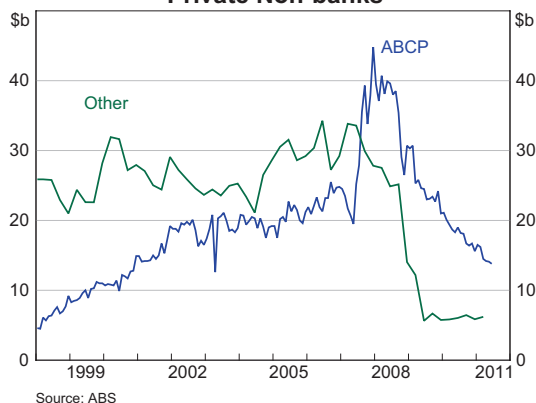
As at 30 June, there was \$12 billion in semi-government short-term debt on issue in the domestic market (although, as with Treasury notes, the outstanding volume can vary substantially through the year). In addition to their domestic issuance, the semi-government authorities also maintain offshore commercial paper (CP) programs. This CP is also issued through dealer panels, but is generally denominated in foreign currencies with the proceeds swapped back to Australian dollars.

Other Short-term Debt Securities

The domestic market for asset-backed commercial paper (ABCP) had grown steadily throughout much of the past decade, with most issuing entities (often known as conduits) acting as warehouses for residential mortgages purchased from a range of originators. However, as with securitised asset markets in general, the market for ABCP was adversely affected by the dramatic reassessment of risk that, from mid 2007, brought about a prolonged period of turmoil in global markets. Initially, domestic issuance rose sharply as the conduits, facing increasingly difficult conditions in Europe and the United States, reoriented their funding onshore (Graph 7). Subsequently, as the domestic market for ABCP also deteriorated, conduits were forced to draw on their back-up liquidity facilities with sponsoring banks.¹⁰

Although a number of programs remain in operation, issuance of ABCP has continued to decline. In part, this reflects a reduction in the supply of assets typically purchased by the conduits (such as mortgage originator loans). Additionally, with investor demand for ABCP slow to recover, the issuance of many conduits has fallen in line with the ongoing amortisation of the loans held by them. The credit ratings for many of the domestic ABCP programs have also been lowered since the period of market turmoil.

Graph 7
Short-term Debt Securities Issued by Private Non-banks



The financial crisis also brought lasting structural change to the issuance of commercial paper by other non-bank entities. The funding difficulties encountered during 2008 and 2009 prompted several major issuers to permanently cease their lending activity in particular markets (such as car dealer finance), with their CP programs scaled back accordingly. Similarly, several of the financing companies affiliated with banks ceased issuing debt into the market in their own name and now either obtain funding directly from their parent bank or have had their financing activity brought onto the parent bank's balance sheet.

¹⁰ For an overview of the Australian ABCP market, see Black and Fisher.

Box B

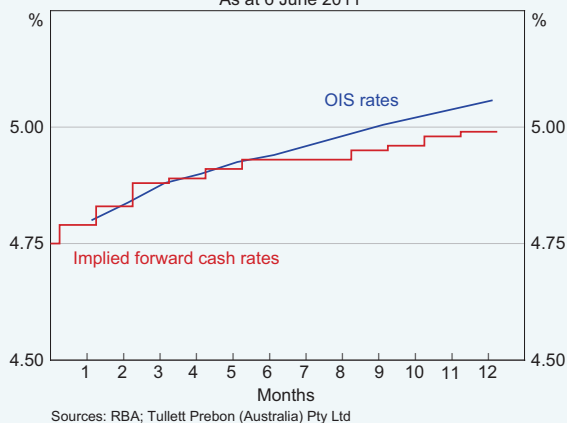
Overnight Indexed Swaps

Interest rate swaps are derivatives in which one party agrees to exchange fixed ('swap') rate payments on a notional amount against receipts determined by a floating (reference) rate applied to the same amount. In the Australian market, overnight indexed swaps (OIS) are swaps referenced to the cash rate – the rate on unsecured loans in the overnight interbank market.

In contrast to yields on debt securities, swap rates cannot strictly be thought of as rates of return, as a swap involves no upfront investment of funds. To earn the OIS rate, an investor would need to receive the fixed rate in the swap and separately place funds equal to the notional amount of the swap in the overnight cash market each day for the duration of the swap. The interest receipts from these overnight loans would offset the floating rate payments that are made in the swap. As such investments in the interbank market incur credit risk, OIS rates are therefore not 'risk-free' rates. However, each day, the investor can decide anew which bank to place funds with. In this regard, overnight bank lending through the life of the swap is less risky than lending to the one bank for the full term. For this reason, OIS rates are usually below the rates on unsecured bank debt (such as bills and CDs) of equivalent maturity (Graph 6). From the borrowing bank's point of view, the spread represents the cost of converting their funding from overnight to term maturity. During the financial turmoil of 2008 and 2009, these spreads became elevated as investors demanded considerable premiums for term lending.

As the cash rate is the operational target for the Reserve Bank's monetary policy, banks use trades in OIS to hedge their interest rate exposure. Others may use OIS to speculate on the near-term direction of the cash rate. For these reasons, OIS rates generally provide the most direct means of gauging market expectations for the future course of monetary policy.¹ For example, just prior to the Reserve Bank Board meeting in June 2011, one-month OIS was quoted at 4.80 per cent (Graph B1). As the existing cash rate target was 4.75 per cent, this implied that market participants saw some chance of an increase in the cash rate during the coming month.²

Graph B1
Forward Cash Rates
 As at 6 June 2011



¹ Similar information can be gleaned from the SFE's 30 day interbank cash rate futures, which are also indexed to the cash rate.

² At the termination of an OIS, the floating rate payment due will be equal to the compounded cash rate over the term of the swap. Because of this compounding, OIS rates will exceed the arithmetic average of the forward cash rates (as in Graph B1).

Subsequently, OIS rates have declined, suggesting that market participants expect a near-term easing in monetary policy.

Inferring expectations about the future cash rate from the OIS curve can be problematic, however. Investors who lock in an interest rate for longer maturities may demand compensation in the form of higher rates. In this sense, forward cash rates may exceed cash rate expectations by a 'term premium'.³

Various statistical techniques can be used to try to extract such a premium, although it is difficult to gain reliable estimates.⁴ Furthermore, movements in OIS rates (and, indeed, in many interest rates) can at times be exaggerated when large shifts in the positions of market participants overwhelm the available liquidity in the market. The dramatic fall in OIS rates during August 2011 may be one instance of such an occurrence.

3 Note that this term premium (which reflects compensation for interest rate risk) is conceptually distinct from that alluded to above when discussing spreads between bank bill and OIS rates. That premium reflects compensation for the additional credit and/or liquidity risk involved in purchasing term funding instruments such as bills. The 'term' risk embedded in OIS (which is a derivative, not a funding instrument) only relates to interest rate risk.

4 Theoretically, there is no reason why this premium may not be negative. However, empirical studies, both on Australian dollar and foreign currency interest rates, generally find that the term premium is positive.

Conclusion

The domestic money market is dominated by bank bills and CDs, principally those issued by the prime banks. The importance of prime bank securities is further enhanced by the reference role that BBSW plays in determining settlement amounts on derivatives and other contractual payments. Recent structural changes have diminished the relative supply of bank bills and CDs and forthcoming changes to the liquidity regulations imposed on ADIs may further alter the market. Since the financial crisis, there has also been a reduction in issuance by securitisers and other private non-bank entities, while changes in the Australian Government's financial position have seen Treasury notes reintroduced into the market. ✎

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The Australian Semi-government Bond Market

David Lancaster and Sarah Dowling*

The semi-government bond market has grown rapidly in recent years, reflecting developments in state government financing needs, in particular increasing funding needs for infrastructure investment. The growth has increased the depth and liquidity of the market, and semi-government securities form an important part of the liquid holdings of Australian financial institutions. This article examines the semi-government bond market, highlighting the relationship between the market's development and its current structure.

Introduction

The market for Australian state and territory government debt, commonly referred to as the semi-government bond market, plays an important role in the Australian financial system, enabling state and territory governments to fund their budgets and support infrastructure investment. The market has grown significantly in recent years and has contributed to the development of the fixed-income market in Australia, providing investors with low-risk investments over long maturities and supporting the market for alternative products, such as inflation-linked bonds.

The deepening of the market has also enhanced liquidity, and semi-government securities now form a significant share of the liquid assets of Australia's financial institutions. The demand for semi-government securities is likely to increase over coming years as the introduction of Basel III reforms requires banks to hold higher levels of liquid assets, which include semi-government securities, as well as Commonwealth Government securities (CGS), balances held at the Reserve Bank of Australia and cash.

Against this backdrop, an overview of the semi-government bond market is presented, beginning with an introduction to the market, its size and composition. The article then describes the drivers of the semi-government bond market, and how they have influenced the market's size and characteristics.

Overview of the Market

Queensland Treasury Corporation and New South Wales Treasury Corporation are the largest semi-government issuers, together representing around two-thirds of the market (Table 1). At the other end of the spectrum, Tasmanian Public Finance Authority, Northern Territory Treasury Corporation and Australian Capital Territory Department of Treasury together represent less than 5 per cent of outstanding semi-government debt. Because Australian treasury corporations are explicitly guaranteed by their respective state governments, treasury corporations' ratings reflect those of their state governments – currently either AAA or AA+.

* The authors are from Domestic Markets Department.

Table 1: State and Territory Treasury Corporations' Borrowing
As at end June 2011

State/ Territory	Long-term		Short-term		Total \$billion	Credit rating ^(a)
	Onshore \$billion	Offshore \$billion	Onshore \$billion	Offshore \$billion		
Qld	63.8	2.7	2.9	1.8	71.1	AA+
NSW	44.7	6.2	1.9	1.7	54.5	AAA
Vic	24.8	0.7	0.3	1.9	27.7	AAA
WA	19.4	0.0	3.4	3.2	26.0	AAA
SA	8.5	0.3	1.4	1.1	11.2	AAA
Tas	2.2	0.0	1.9	1.6	5.7	AA+
NT	2.7	0.0	0.1	0.0	2.8	AA+
ACT	1.2	0.0	0.3	0.0	1.5	AAA
Total	167.3	9.8	12.0	11.4	200.5	

(a) Standard & Poor's rates all Australian states and territories, except the Northern Territory which is rated equivalent to AA+ by Moody's
Source: state and territory treasury corporations

The bulk of issuance in the semi-government market has been long-term debt securities issued into the domestic market with an original term-to-maturity of greater than one year. Long-term debt is largely comprised of 'benchmark' bonds – generally liquid bonds where the issuing state treasury corporation commits to maintaining a minimum amount outstanding in the bond at any given time.¹ By value, benchmark bonds account for at least 85 per cent of total issuance for all states and territories, except the ACT. The amount of any given bond has also been increasing in recent years; the average issue size of fixed-rate bonds has increased 50 per cent since 2005. This has contributed to the liquidity of the semi-government bond market, as larger issues are typically easier to trade.

Treasury corporations also issue short-term securities to assist in the management of their cash flows. These short-term borrowings are in the form of domestic notes and foreign commercial paper programs. They allow the treasury corporations to

smooth their cash flow needs, particularly when large bond maturities fall due. As at June 2011, there were \$12.0 billion in domestic semi-government notes outstanding, consisting primarily of securities issued by Western Australian Treasury Corporation, Queensland Treasury Corporation, New South Wales Treasury Corporation and Tasmanian Public Financing Authority.²

Drivers of Issuance

The semi-government bond market has grown rapidly in recent years, and is now broadly similar in size to the CGS market. As at June 2011, there were around \$167 billion in semi-government bonds outstanding, representing an increase of around \$110 billion since the beginning of 2005 (Graph 1).

Around two-thirds of outstanding semi-government bonds were issued to fund capital expenditure by government-owned corporations, commonly referred to as Public Trading Enterprises (PTEs). These corporations provide essential services to the community, primarily through the development

1 The precise definition varies by state. For example, Victoria commits to maintaining benchmark bond lines at \$2.5 billion to \$3 billion, whereas the Northern Territory has 'institutional lines' with between \$300 million and \$500 million on issue.

2 For more information on short-term securities, see Boge and Wilson (2011).

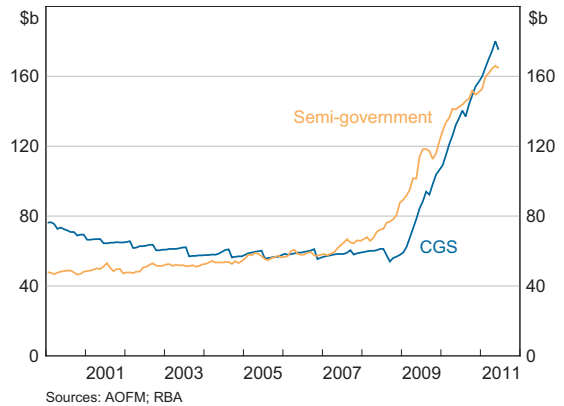
of state infrastructure assets. Australian treasury corporations had around \$100 billion in on-lending outstanding to PTEs as at June 2010. The bulk of the remainder of outstanding bonds have funded state and territory government budgets, with a minority of states also borrowing on behalf of local governments.

Aggregate capital expenditure by PTEs has grown steadily since 2000 with total expenditure peaking at over 2 per cent of GDP in the 2010 financial year (Graph 2). State government stimulus programs resulted in particularly strong infrastructure spending in the 2009 and 2010 financial years as investment programs were brought forward. This led to robust growth in the semi-government market as treasury corporations funded this stimulus. As these programs are completed, aggregate capital expenditure by PTEs is expected to decline, although the state and territory treasuries still forecast strong capital expenditure by PTEs in coming years.

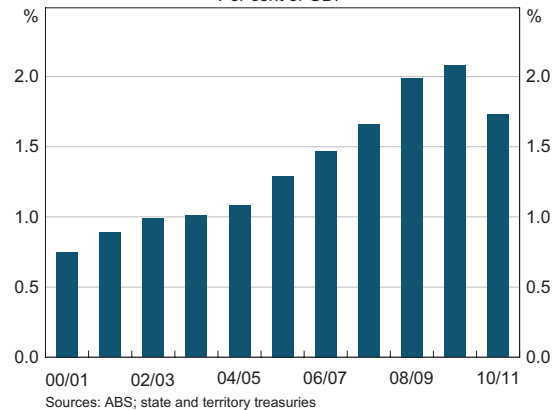
The electricity sector is the largest recipient of funding from state treasury corporations. New South Wales Treasury Corporation and Queensland Treasury Corporation had total loans outstanding to the electricity sector amounting to \$17.1 billion and \$13.7 billion, respectively, as at June 2010 (Graph 3). Victoria, on the other hand, did not have loans outstanding to the electricity sector, having reduced the public-sector funding burden through privatisation of electricity assets in the 1990s. In recent years, other state governments have also sought to reduce the size of their balance sheets and promote infrastructure investment by the private sector by privatising electricity assets. Nevertheless, most state governments still own electricity assets, the maintenance and expansion of which will ensure continuity of demand for state treasury corporations' funding services.

Other major clients of treasury corporations include water and transport sector PTEs. Queensland Treasury Corporation had \$12.5 billion in outstanding loans to the transport sector as at June 2010, primarily for the development of road and rail infrastructure. For other

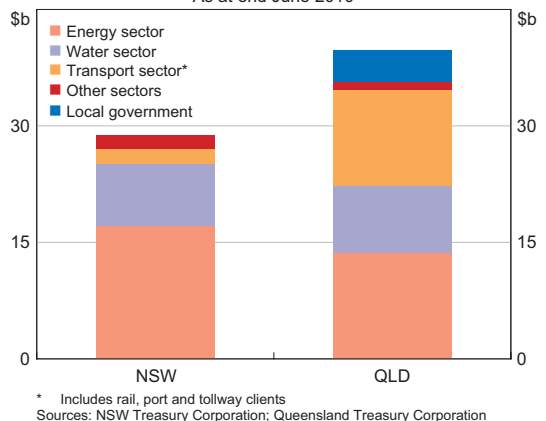
Graph 1
Domestic Government Bonds Outstanding



Graph 2
Aggregate Capital Expenditure by PTEs
Per cent of GDP



Graph 3
State Treasury Corporation Lending to PTEs and Other Clients
As at end June 2010



states, such as New South Wales, public funding of transport infrastructure has mainly occurred directly through state treasuries.

Structure of the Market

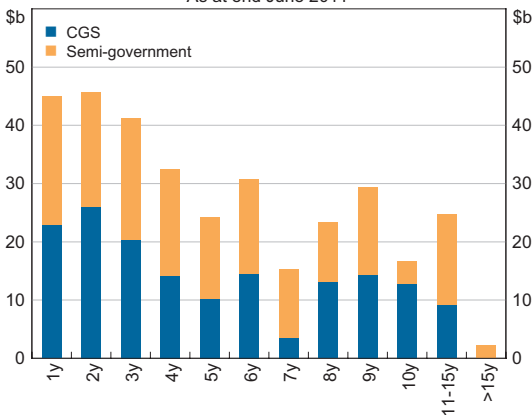
The long operating lives of PTEs' infrastructure assets mean that treasury corporations have actively sought to extend the maturity profile of their debt. State treasury corporations seek to borrow at the longest maturities possible, with the maturity profile of the CGS market generally constraining issuance at longer tenors. CGS provides primary pricing for the domestic yield curve, and hence it is difficult for semi-government bonds to be issued at longer maturities than CGS; the longest tenor of a nominal CGS is currently 12 years. The weighted average term to maturity of the semi-government market is slightly longer than that of the CGS market – 5.5 years compared to 5.0 years. Around 11 per cent of the semi-government market comprises bonds with maturities greater than 10 years, compared to 6 per cent for the CGS market (Graph 4).

State treasury corporations fund themselves almost entirely in the domestic market, with domestic bonds constituting over 90 per cent of the outstanding stock of semi-government

bonds (Graph 5). In the past, bonds issued offshore through 'global exchangeable bond' programs provided some foreign investors with tax benefits.³ However, following tax changes in December 2008, state treasury corporations are no longer issuing global exchangeable bonds and have instead actively sought to repurchase outstanding stock of these securities. This has led to a decline in the outstanding stock of global exchangeable bonds in recent years.

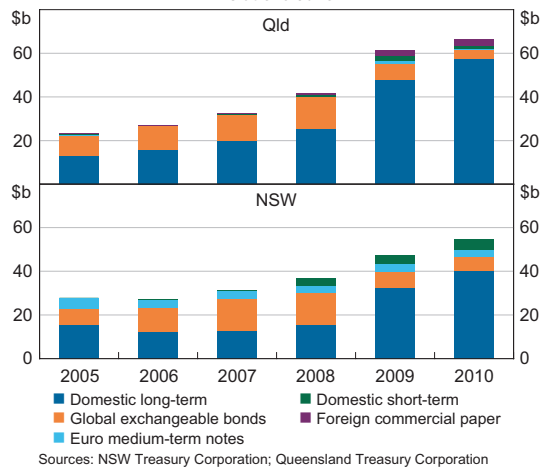
The largest treasury corporations issue some foreign currency bonds using euro medium-term note programs, although foreign currency funding represents only a small proportion of their total capital market borrowings. For example, New South Wales Treasury Corporation had \$3.5 billion in euro medium-term notes outstanding as at June 2010. Because PTEs do not require funding in foreign currencies, state treasury corporations use derivatives to ensure that foreign currency denominated borrowing is hedged into Australian dollars.

Graph 4
Government Bonds Outstanding by Term to Maturity*
As at end June 2011



* Excludes inflation-linked bonds and annuities
Sources: AOFM; RBA

Graph 5
Treasury Corporations' Debt Outstanding
As at end June



³ Global exchangeable bonds are Australian dollar-denominated bonds issued overseas that are exchangeable for an equivalent domestic bond at the holder's option. They were a popular means of ensuring that interest withholding tax was not paid unnecessarily.

State treasury corporations also issue inflation-linked bonds to meet demand from PTEs for inflation-linked borrowing. These PTEs, mostly utilities and infrastructure companies, favour inflation-linked bonds because of the sensitivity of their revenue to inflation over the long term and the ability to attract investors at longer maturities. Insurers, superannuation funds and mutual funds are natural investors for inflation-linked bonds, because they offer long-dated maturities and provide a hedge against inflation. New South Wales Treasury Corporation has been particularly active in tailoring issuance to investor demand, with significant inflation-linked issuance in both 2009 and 2010. As at June 2011, there were around \$7 billion of semi-government inflation-linked bonds outstanding, compared with \$14 billion of inflation-linked CGS.

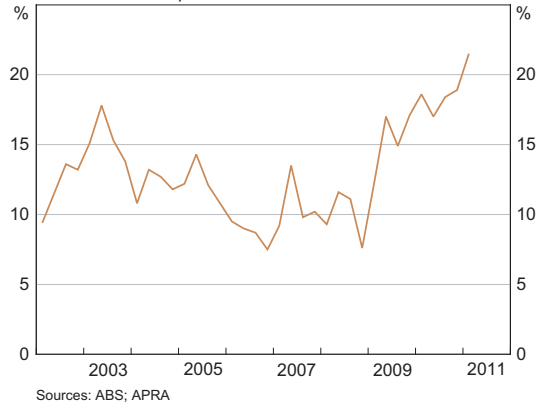
As noted previously, demand from investors holding semi-government securities for liquidity purposes has also supported issuance by state treasury corporations. By market value, Australian banks are the largest domestic investors in semi-government securities, holding around 21 per cent of the outstanding stock of semi-government bonds in March 2011 (Graph 6). State treasury corporations also hold other states' semi-government bonds for liquidity management purposes.

Domestic investors, particularly banks, have increased their share of semi-government bonds since the onset of the financial crisis. Domestic investors now hold around 60 per cent of the market value of semi-government bonds outstanding, up from 53 per cent in June 2007 (Graph 7). This compares with current domestic holdings of around 30 per cent of CGS outstanding.

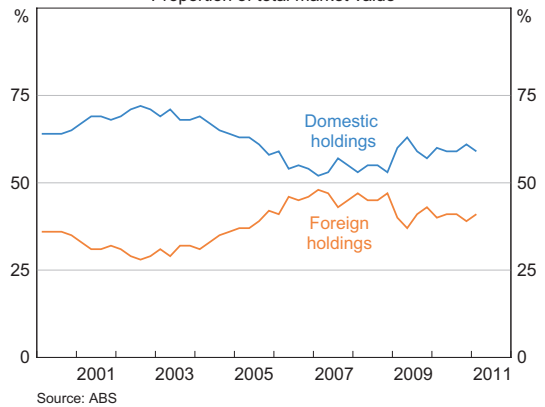
Pricing of Semi-government Securities

Explicit backing by their respective state governments has meant investors generally perceive credit risk for state treasury corporations to be low. This has typically resulted in semi-government bonds trading at tight spreads to CGS (Graph 8). Nevertheless,

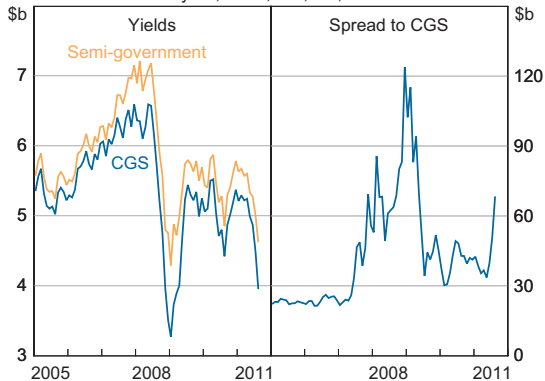
Graph 6
Banks' Holdings of Semi-government Bonds
Proportion of total market value



Graph 7
Total Holdings of Semi-government Bonds
Proportion of total market value



Graph 8
Semi-governments' Bond Pricing*
5-year; NSW, Qld, Vic, WA



* Includes debt guaranteed by the Australian Government; weighted by 4-6 year state debt outstanding; fixed rate greater than \$100 million only. Sources: RBA; UBS AG, Australia Branch; Yieldbroker

during periods of market distress, semi-government bond spreads generally widen, as investors seek to hold more of the safest and most liquid securities – namely CGS. During the period of market dislocation following mid 2007, the spread between the yields of semi-government securities and CGS widened to over 120 basis points, up from around 25 basis points before the crisis. Although currently well below their peaks in late 2008, recent market uncertainty has caused spreads to rise in recent months. The increase in spreads during periods of heightened risk aversion may in part reflect the fact that some investors, particularly offshore investors, are not always familiar with the extent of vertical fiscal integration in Australia, whereby state governments receive a large share of their revenue via redistributions of Australian Government tax receipts.

The Australian Government announced in March 2009 that it would establish a guarantee scheme for state and territory borrowings. It provided support to the states during the financial crisis when debt issuance was very challenging for non-sovereign borrowers. The guarantee scheme allowed treasury corporations to opt in voluntarily to guarantee any new or existing Australian dollar treasury corporation debt for a fee paid to the Australian Government. The two largest issuers of semi-government securities – Queensland and New South Wales – were the two states that decided to use the government guarantee, which was closed to new issuance on 31 December 2010.

Borrowing conditions have improved since the financial crisis with spreads retracing most of the widening that occurred over that period. As unguaranteed debt became less costly to issue than guaranteed debt, Queensland Treasury Corporation and New South Wales Treasury Corporation actively sought to reduce their guaranteed debt outstanding through buybacks and switches. Currently, around 35 percent of Queensland Treasury Corporation's and New South Wales Treasury Corporation's long-term debt is guaranteed by the Australian Government.

Summary

State and territory treasury corporations provide funding services, both to finance infrastructure development and to support the operating position of state and territory governments. In response to an increase in demand for funding, the semi-government bond market has grown rapidly in recent years, with the market now similar in size to the Commonwealth Government bond market. The vast majority of semi-government issuance takes place in the domestic market through long-term benchmark issues where minimum outstanding amounts are maintained to promote liquidity. Upcoming Basel III liquidity reforms will mean that semi-government securities are likely to continue to be an important feature of the balance sheets of Australian banks. ✎

Reference

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Cash Use in Australia: New Survey Evidence

John Bagnall and Darren Flood*

The Reserve Bank has completed its second study of consumers' use of payment instruments. The study indicates that cash remains the most common form of payment by consumers. It is used extensively in situations where average payment values are low and where quick transaction times are preferred. Nonetheless, cash use as a share of total payments has declined, falling as a share of both the number and value of payments. Two important factors contributing to this decline are the substitution of cards for cash use, particularly for low-value payments, and the increasing adoption of online payments.

Introduction

Information on the use of cash in the Australian economy has traditionally been difficult to obtain. This is because, unlike most other forms of payment, cash transactions do not need to pass through the banking system where information on payments can be captured. Given this, the Reserve Bank has used surveys of consumers' use of payment instruments to better understand the use of cash. This article reports information obtained from a recent survey, conducted in late 2010.¹ It finds that, while cash remains the most common form of consumer payment and the dominant form for low-value transactions, its use has declined over recent years, as use of payment cards and online payments has increased. The study results also indicate that cash is used more extensively in merchant locations that process high volumes of low-value payments, and that both younger and older age groups tend to make a higher proportion of payments with cash than those in age groups between 30 and 50 years.

The Consumer Payments Use Study

The Bank first undertook a study of consumers' payment patterns in 2007 as part of its 2007/08 Review of the Payments System Reforms, and repeated the study in late 2010 as part of its Strategic Review of Innovation in the Payments System.² Both the 2007 and 2010 studies used a similar methodology, based on the Roy Morgan Research Financial Transaction Diary® (the diary). For the 2010 study, individuals were asked to record in the diary details of every purchase, bill payment and cash withdrawal made over a one-week period, including information on the type of payment (e.g. cash, credit card, BPAY), the channel (e.g. in person or internet) and the type of merchant to which the payment was made. In total, 1 240 valid responses were received, resulting in a sample of almost 19 500 payments with a total value of around \$1.3 million.

The 2010 study also contained a questionnaire, which was completed at the end of the diary period and designed to provide further insight into consumers' payment behaviour and their preferences regarding different types of payments.

* The authors are from Payments Policy Department.

1 For a full description of the results of the 2010 survey, including the use of non-cash payment methods, see Bagnall, Chong and Smith (2011).

2 Results from the first study are reported in Emery, West and Massey (2008). For information on the Strategic Review, see RBA (2011).

Broad Patterns in Cash Use

Consistent with the 2007 study, cash is the most frequently used payment method by consumers, accounting for 62 per cent of payments. Cash is particularly dominant for low-value payments by individuals, making up around 80 per cent of transactions of \$25 and under, and 47 per cent of transactions between \$25 and \$50 (Graph 1). But as payment values rise, consumers increasingly use other methods, so that cash accounts for a relatively small share of payments above \$100. Payment cards (credit and debit) account for the majority of

payments between \$50 and \$500, while BPAY and internet/telephone banking play an increasing role for payments above \$500.

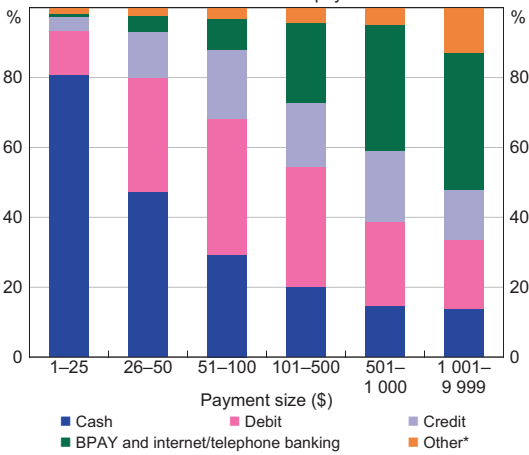
Cash makes up a larger share of payments that are made in person, accounting for 68 per cent overall and the majority of in-person payments up to a value of around \$50 (Graph 2). Understandably, there is a wide range of approaches taken by individuals in their use of cash. During the week of the study, around 17 per cent of respondents made all of their in-person payments using cash, while 5 per cent made no cash payments at all.

The pattern of cash use is a reflection of the characteristics of cash, which make it appealing for low-value payments in particular. One key characteristic of cash is that it is almost universally accepted for small payments. In contrast, some businesses either do not have card acceptance facilities or limit card payments to transactions above a given value. Cash payments are typically also quicker to conduct than the alternatives. The average time to make a cash payment at the point of sale has been estimated to be around 20 seconds, compared with 35 seconds for eftpos, 45 seconds for credit cards (using signature) and 90 seconds for cheques.³ These rankings do not change when other related costs, such as the time to make ATM withdrawals, pay credit card bills or reconcile statements are taken into account. Responses to the end-of-study questionnaire highlight the fact that transaction speed is an important factor in determining the payment method used by consumers at the point of sale (Graph 3).

Reflecting the use of cash for small payments, the median value of a cash payment is quite low, at around \$12, compared with \$38 for debit card payments, \$49 for credit cards and \$132 for internet/telephone banking (Table 1). This means that despite accounting for the majority of consumer payments, cash makes up only around one-quarter of the value of all consumer payments; card payments account for a little over a third of the value of payments.

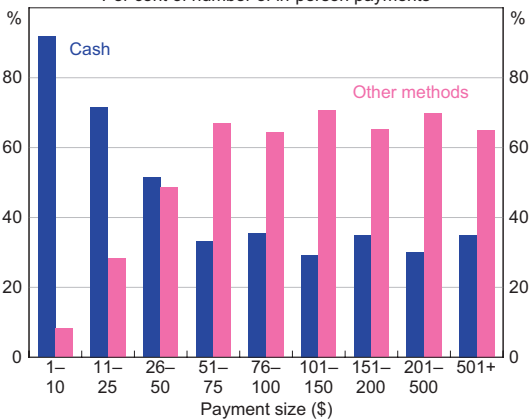
3 These estimates are from time and motion studies conducted by Australian merchants with high turnover. See Schwartz *et al* (2008).

Graph 1
Use of Payment Methods by Payment Size
Per cent of number of payments



* Includes cheques, Paymate, PayPal, POLi, Cabcharge, money orders, petrol cards, prepaid cards and store cards
Source: Roy Morgan Research

Graph 2
Use of Cash and Other Payment Methods
Per cent of number of in-person payments



Source: Roy Morgan Research

Graph 3
Factors Influencing Choice of Payment Method at the Point of Sale*

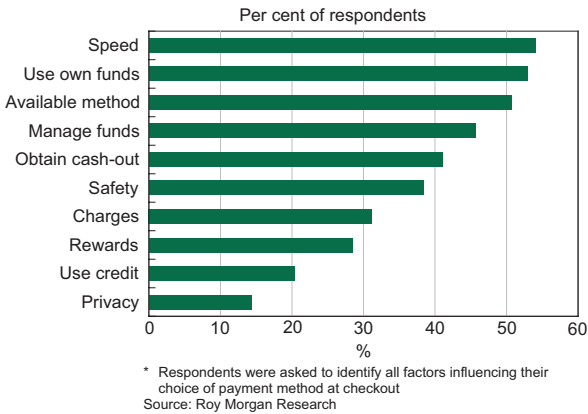


Table 1: Median Payment Values

Payment method	\$
Internet/telephone banking	132
BPAY	100
Personal cheque	90
American Express/Diners Club card	50
MasterCard/Visa credit card	49
eftpos	38
MasterCard/Visa debit card	38
Paymate, PayPal and POLi	27
Other ^(a)	16
Cash	12

(a) Includes Cabcharge payments, money orders, petrol cards, prepaid cards and store cards
 Source: Roy Morgan Research

While cash is clearly a critical element of Australia's payments landscape, its share of total payments has been declining. Existing data on the value of cash withdrawals (which can be used as a proxy for the value of cash payments) suggest that cash use relative to other payment methods has been declining for some time.⁴ Data from the 2007 and 2010 consumer payments studies confirm this. Although the average number of cash payments per person increased slightly between study periods, this

4 See, for example, the discussion of trends in retail payments in RBA (2010), pp 7–11.

increase was less than for other payment methods (Table 2). As a result, the share of cash use in the total number of payments also decreased, from 70 per cent in 2007 to 64 per cent in 2010.⁵ As a share of payments made in person, the decrease was from 74 per cent to 68 per cent.

The decline in cash use appears to have occurred across all but the highest payment values and appears to reflect a shift towards card (particularly debit card) payments; the share of payments below \$50 made on cards increased from 19 per cent in 2007 to 24 per cent in 2010. In part, the decline in cash use may also have been driven by increased use of the internet to make payments, where cash is not an option; internet payments as a share of credit card payments increased from 7 per cent to 9 per cent over the three years between studies.

The findings of the Reserve Bank's study are broadly in line with payment patterns observed in other international studies, although there is considerable variation in overall cash use across countries. For example, in 2008 the Deutsche Bundesbank found cash to be the dominant payment method for lower-value payments in Germany, and responsible for around 83 per cent of all payments.⁶ The Norges Bank was able to compare the results from surveys conducted in 1993 and 2007, showing that cash as a share of payments at the point of sale declined dramatically in Norway over this period, from 84 per cent to 24 per cent.⁷

5 For comparisons between the 2007 and 2010 studies, we exclude payment methods not included in both studies, as well as payment methods classified in the 'other' category. This is aimed at achieving a like-for-like comparison, whereby we are comparing the same payment methods in both 2007 and 2010. Internet banking/telephone payments and payments processed by specialist online providers (e.g. PayPal) are excluded because they were only captured in 2010, while the 'other' category is excluded because of differences between the types of transactions recorded in that category in 2007 and 2010.

6 For more information on payments behaviour in Germany, see Deutsche Bundesbank (2009).

7 See Gresvik and Haare (2008).

Table 2: Use of Payment Methods

	2007		2010	
	Average ^(a) Per person per week	Share Per cent	Average ^(a) Per person per week	Share Per cent
Cash	9.3	70	9.5	64
Card	3.5	27	4.7	32
BPAY	0.3	2	0.5	3
Personal cheque	0.2	1	0.1	1
Total	13.3	100	14.8	100

(a) The average number of payments may be affected by survey fatigue, whereby fewer payments are recorded towards the end of the diary period, although this effect is likely to be small

Source: Roy Morgan Research

Merchant and Demographic Characteristics of Cash Use

Examining the use of cash within individual merchant categories indicates how cash is used and why its use has declined somewhat relative to other payment methods.

As discussed, cash is the dominant instrument for: payments made in person; where average payment values are low; and where quick tender times are preferred. This is clearly reflected in payment patterns in hotels/bars and small food and take-away stores, where at least 85 per cent of payments are made by cash (Table 3). In many such businesses, transaction speed is critical and the cost of card acceptance may exceed the benefits; therefore, card acceptance may be limited. By contrast, cash is only used for around 20 per cent of payments for household bills and holiday travel, where payment values tend to be larger and many payments are made remotely.

A declining share of payments made by cash is evident across nearly all merchant categories. By far the sharpest declines between 2007 and 2010 occurred in household bills (–17 percentage points) and health (–10 percentage points). The former appears to reflect a shift towards online payment of bills using scheme cards or BPAY. The end-of-study questionnaire indicated that around 60 per cent of consumers with internet access now pay most of their bills online. Reduced cash use for health payments may be driven by a number of factors, including the greater availability of in-person

electronic claims from Medicare and health funds and an increase in the average size of payments – up from \$56 in 2007 to \$71 in 2010. Cash use also fell strongly in the leisure category (–8 percentage points), which includes sports, entertainment, cinemas and zoos; in part, this reflects an increase in the proportion of payments made online, up from 2 per cent in 2007 to 6 per cent in 2010. On the other hand, use of cash has increased over the past three years in restaurants/cafés, possibly reflecting increased incidence of surcharging of credit cards.

Despite the apparently widespread fall in cash use, the majority of payments continue to be made by cash in all but four merchant categories.

Age appears to be an important determinant of consumers' payment patterns. Although all age groups make extensive use of cash, individuals in both younger and older age groups make a greater proportion of payments with cash than those in the age groups between 30 and 50 years (Graph 4).⁸ This reflects a number of influences. Individuals may develop payment habits based on the payment methods that were prominent during their early adult years, with older consumers having formed their habits before the widespread availability of payment cards. Less access to, and familiarity with, the internet might also result in people in older age groups making more use of in-person cash payments

⁸ Survey respondents were aged 18 years and over, with a weighted average age in the 40–44 age group. Survey responses were weighted according to gender, age group, geographical location (metropolitan or regional) and credit card holding.

Table 3: Cash Use by Merchant Categories
Per cent of number of payments

Merchant category	Share of cash payments in 2010	Change from 2007
	Per cent	Percentage points
Take-away food	87	-7
Hotel/bar	87	-4
Small food store	85	-4
Restaurant/café	84	7
Transport	80	-3
Leisure	79	-8
Other ^(a)	72	1
Services ^(b)	59	-3
Other retailer ^(c)	58	-6
Supermarket/liquor	54	-7
Health	45	-10
Petrol	44	-3
Holiday travel	22	-3
Household bills	20	-17
All categories	64	-6

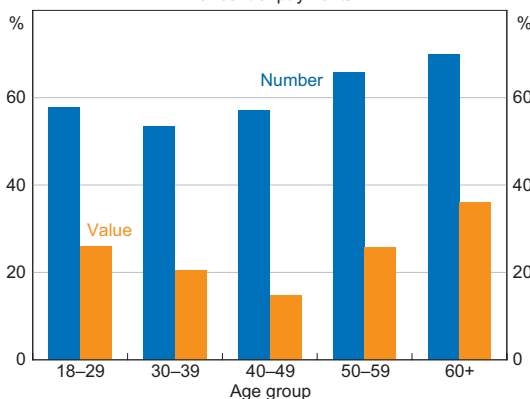
(a) Any payments (including charitable donations) that do not fit into the other categories

(b) Includes plumbers, hairdressers, home repairs, baby sitting, accountants and legal services

(c) Includes furniture and bedding stores, whitegoods retailers, computer stores, department stores, clothing/footwear stores, book stores, newsagents and hardware stores

Source: Roy Morgan Research

Graph 4
Use of Cash by Age Group
Per cent of payments



Source: Roy Morgan Research

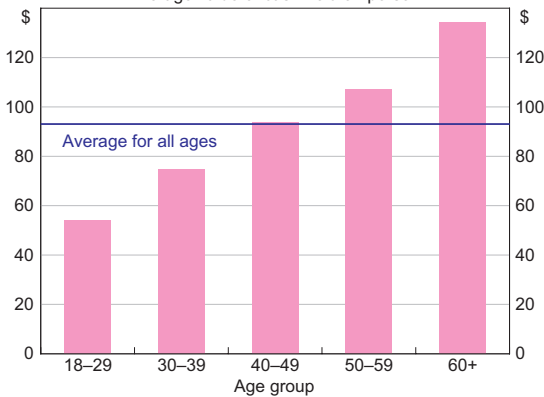
than other age groups. In addition, individuals in both the younger and older age groups tend to have lower-than-average incomes; accordingly, they are likely to be more restricted in their payment options, particularly in their access to credit cards, and also make fewer high-value payments, which are dominated by non-cash methods.

Cash Holdings and Withdrawals

In addition to payment patterns, the 2010 study gathered information on both cash holdings by individuals and their withdrawal patterns. The study results suggest that, on average, consumers carry \$93 in cash on their person, with the amount increasing with age (Graph 5).⁹ In a typical month, consumers make around 5½ cash withdrawals, with ATMs the main source, averaging around

⁹ Those respondents aged under 30 held \$54 in cash, on average, compared with \$134 for those aged 60 years and over.

Graph 5
Cash Holding by Age Group
 Average value of cash held on person



Source: Roy Morgan Research

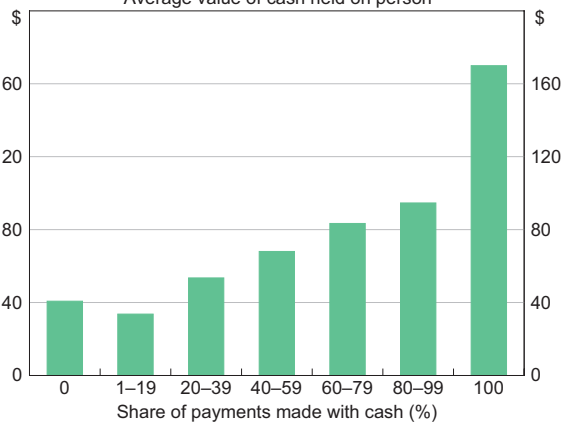
3½ withdrawals per month (Table 4). Most of the remaining withdrawals are eftpos cash-outs (1½ per month). Over-the-counter withdrawals are relatively infrequent, but the average value of each withdrawal is relatively high, at around \$1 400, compared with nearly \$200 for an ATM withdrawal and around \$80 for an eftpos cash-out.¹⁰ The average withdrawal for all methods is a little over \$230, which funds around nine average-sized cash payments.¹¹

Overall, the number of cash withdrawals made by consumers decreased by 6 per cent between 2007 and 2010, while the average amount withdrawn on each occasion rose from around \$180 to around \$230. These patterns are likely to have been influenced by the move to direct charging at ATMs in March 2009, which has seen consumers reduce the number of

ATM withdrawals they make, increase use of eftpos cash-outs and increase average withdrawal sizes.¹²

The level of consumers' cash holdings tends to be related to both the frequency of their cash withdrawals and their choice of payment instrument. Those with larger holdings tend to make smaller numbers of withdrawals and those withdrawals are correspondingly larger. This suggests a preference to hold larger cash amounts in order to minimise withdrawals. On the other hand, many respondents held very little cash, with around 13 per cent having \$5 or less on their person and around 20 per cent having \$10 or less.¹³ While some of these respondents were making frequent withdrawals to maintain a low cash holding, many were making few withdrawals because they were also making few cash payments. As a result, respondents holding small amounts of cash were more likely to be low cash users (Graph 6).

Graph 6
Cash Holding by Share of Payments with Cash
 Average value of cash held on person



Source: Roy Morgan Research

10 The average over-the-counter withdrawal size is heavily influenced by a small number of high-value transactions in the 2010 survey. In general, the survey data suggest somewhat higher transaction sizes than the Reserve Bank's monthly Retail Payment Statistics (RPS) collection. Based on the RPS data, the average size of an ATM withdrawal was \$178 in late 2010, compared with \$197 based on the survey, while the average sizes of eftpos cash-outs were \$57 and \$78, respectively. Some difference in the results is to be expected; whereas the surveys capture transactions by individuals aged 18 and over (excluding business-related transactions), the RPS data collection aggregates all transactions.

11 The average size of a cash payment is \$27. A median cash withdrawal of \$100 would fund around eight median-sized transactions of \$12.

12 See Flood, Hancock and Smith (2011) for more discussion on the impact of the ATM reforms.

13 The questionnaire asked respondents for the amount of cash in their wallet or purse rounded to the nearest \$5, although many respondents gave amounts to the nearest dollar.

Table 4: Average Cash Withdrawals^(a)

	Number		Value (\$)		Average withdrawal size (\$)	
	Per person per month		Per person per month			
	2007	2010	2007	2010	2007	2010
ATM	4.0	3.7	743	722	182	197
eftpos cash-out	1.2	1.5	99	119	83	78
Over-the-counter ^(b)	0.6	0.3	238	448	386	1 395
Total^(c)	5.8	5.5	1 080	1 289	181	234

(a) Average withdrawals may be affected by survey fatigue, whereby fewer withdrawals are recorded towards the end of the diary period, although the effect is likely to be small

(b) Average withdrawal sizes for over-the-counter withdrawals are heavily influenced in 2010 by a small number of high-value transactions. The median over-the-counter withdrawal increased from \$250 in 2007 to \$385 in 2010. By contrast, the medians for ATM withdrawals and eftpos cash-outs were unchanged across surveys at \$100 and \$50, respectively.

(c) Excludes withdrawals by other methods, such as cash from a Medicare office, lottery tickets or money from friends

Source: Roy Morgan Research

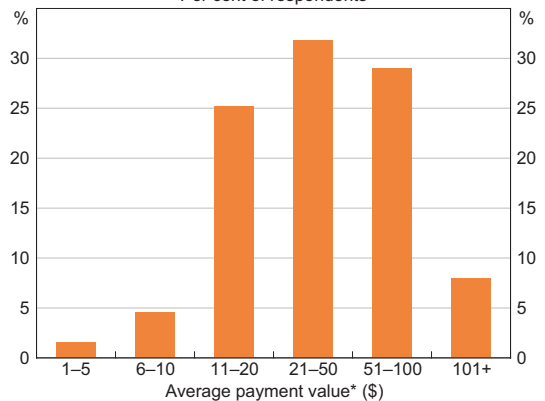
Future Trends

New payment technologies that reproduce some of the features of cash have the potential to continue and possibly accelerate the decline of cash payments. Contactless card payments, in particular, seem to offer some of the key characteristics that people like in cash. These require the consumer only to hold their card in close proximity to the terminal, or to touch the card against it, and do not require a PIN or signature for the transaction. While the availability of contactless cards and terminals has accelerated recently, at the time of the 2010 study contactless payments were still not widely used.

As noted above, around half of respondents indicated in the end-of-study questionnaire that the speed of processing – a prominent feature of contactless payments – was an important factor in their choice of payment method at the point of sale. However, there are also some important characteristics of cash that are not necessarily possessed by contactless cards. Around 15 per cent of respondents indicated that privacy influenced their choice of payment method at the point of sale. These respondents tended to be relatively high users of cash and may be less likely to adopt contactless payments.

At this stage it is not clear that contactless payments are primarily being substituted for cash. Although contactless functionality is largely targeted at cash replacement, payment values recorded for contactless payments in the study were high relative to the median cash transaction, suggesting that they may primarily be replacing more standard debit and credit card transactions at the point of sale (Graph 7).

Graph 7
Size Distribution of Contactless Payments
Per cent of respondents



* Average values are rounded up to the nearest dollar
Source: Roy Morgan Research

Conclusion

The Reserve Bank's updated Consumer Payments Use Study confirms that cash remains the dominant payment method for low-value payments at the point of sale. It is used extensively in situations where average payment values are low and where quick transaction times are preferred, such as at hotels/bars and small food and take-away stores. Usage tends to be higher for older and younger consumers than those in the age groups between 30 and 50 years. Nonetheless, cash use as a share of total payments has declined, falling as a share of both the number and value of payments by consumers between the 2007 and 2010 studies. This has occurred across most merchant types and payment values and appears in many cases to reflect payment cards replacing cash use, particularly for low-value payments. This substitution may increase further over time as the use of contactless payments becomes more widespread, given the importance placed by individuals on processing speed at the point of sale. It is also clear that for particular payment types (e.g. bills), online payments are increasingly replacing in-person payments and therefore reducing cash use. ✖

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Recent Trends in Counterfeiting

Arianna Cowling*

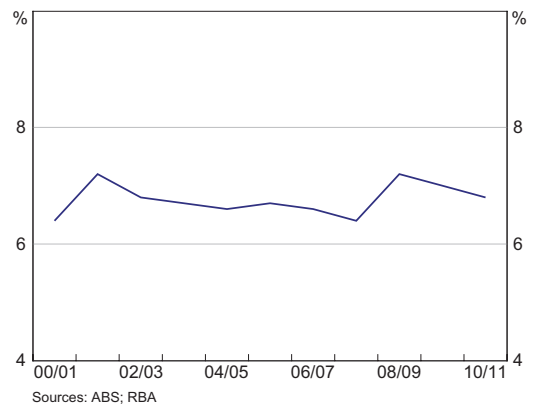
Under the *Reserve Bank Act 1959*, the Reserve Bank has sole authority to issue banknotes in Australia. As such, a key responsibility of the Reserve Bank is to maintain public confidence in banknotes, so that they remain an effective payment mechanism and a secure store of wealth. This article examines how counterfeiting can impact on this confidence, and counterfeiting trends in Australia and overseas. The article also discusses the strategies the Reserve Bank employs to minimise the risks of counterfeiting and maintain public confidence in banknotes.

The Use of Banknotes

Despite the increasing acceptance of a wide range of alternative payment mechanisms, currency or cash (defined as banknotes and coin) continues to be an essential element of the payments system, both as a means of exchange and a store of wealth. The Reserve Bank's 2010 Consumer Payments Use Study, for example, suggests currency accounts for 62 per cent of payments made by consumers and is used extensively for low-value payments. According to the study, currency is used for around 80 per cent of transactions under \$25 and almost half of all transactions between \$25 and \$50 (Bagnall and Flood 2011). Highlighting the continued importance of currency in the Australian payments system, the value of banknotes on issue has grown by an average of around 6 per cent a year over the past decade, broadly in line with the growth in household consumption (Graph 1).

As at June 2011, there were 1.1 billion banknotes, worth \$50.1 billion, on issue. The \$50 banknote represents the majority of banknotes in circulation, currently accounting for 45 per cent of the number and 49 per cent of the value of banknotes on issue. In contrast, the lowest denominations – the \$5 and \$10 banknotes – collectively account for less than 23 per cent of the

Graph 1
Value of Banknotes on Issue
Per cent of consumption



number and only around 3 per cent of the value of banknotes on issue (Table 1).

The widespread use of currency reflects a number of factors including: the ease with which transactions can be undertaken; the anonymity that currency provides; and the public's confidence in currency as a secure medium of exchange and trusted store of wealth. The importance of this latter factor was particularly highlighted during the global financial crisis when demand for banknotes, particularly higher-value banknotes, increased significantly (Graph 2).

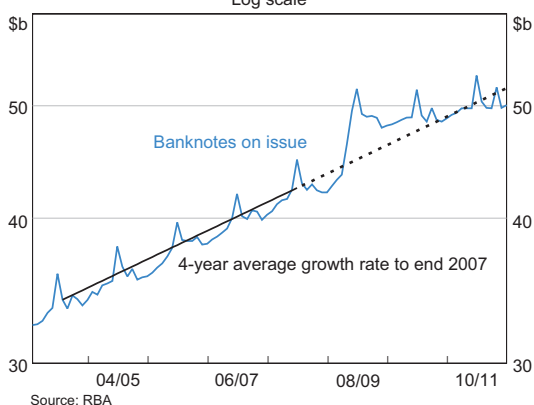
* The author is from Note Issue Department.

Table 1: Banknotes on Issue
\$ billion

At end June	\$5	\$10	\$20	\$50	\$100	Total
2004	0.5	0.8	2.5	15.9	14.2	34.0
2005	0.5	0.8	2.6	16.7	14.9	35.6
2006	0.6	0.9	2.7	18.0	15.9	38.1
2007	0.6	0.9	2.8	19.2	16.7	40.3
2008	0.6	0.9	2.7	20.1	17.7	42.1
2009	0.6	1.0	2.7	23.7	20.1	48.1
2010	0.7	1.0	2.7	23.7	20.7	48.8
2011	0.7	1.0	2.8	24.3	21.2	50.1

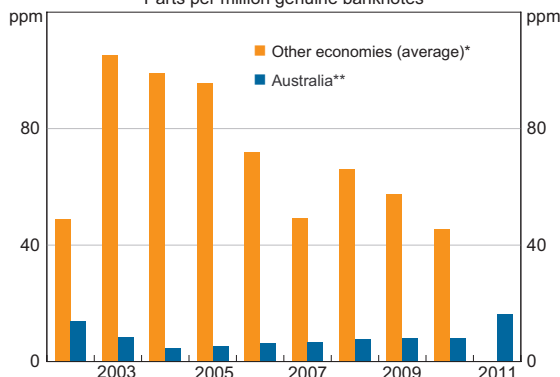
Source: RBA

Graph 2
Banknotes on Issue
Log scale



Source: RBA

Graph 3
Counterfeits Detected
Parts per million genuine banknotes



* Includes: Canada, Denmark, euro area, Mexico, New Zealand, Russia, Switzerland, UK

** Data are by financial year

Source: central banks

Counterfeiting of Australian Banknotes

One factor that can undermine public confidence in currency as a medium of exchange and store of wealth is counterfeiting. Currency counterfeiting, which has existed for thousands of years, occurs in virtually every country, and while Australia is no exception, counterfeiting rates here are low (Graph 3). Since 2001, on average around 8 counterfeits have been detected each year for every million banknotes in circulation (or 8 parts per million). There have, however, been periods where the counterfeiting rate has risen noticeably. For example, in 2001/02 the activities of a small number of counterfeiters led to an increase in the number of counterfeits detected, but after these operations were disrupted, the counterfeiting rate declined. More recently, there was a temporary increase in counterfeiting in 2010/11, to around 16 parts per million, but following a number of arrests the counterfeiting rate fell sharply to be in line with historical experiences.

Even taking into consideration these periods of increased counterfeiting activity, Australia's counterfeiting rates are low relative to many other economies (Graphs 3 and 4). Counterfeiting rates of between 50 and 100 parts per million are more typical overseas.

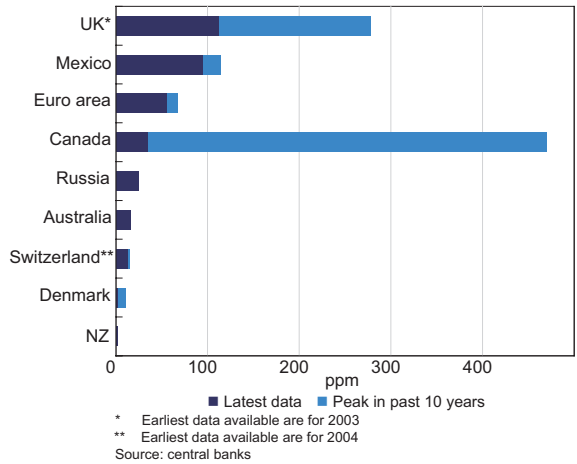
Although there have been examples of all denominations of Australian banknotes being counterfeited, the most commonly counterfeited denomination is the \$50 banknote; over the past 10 years, almost 80 per cent of all counterfeits detected have been of the \$50 denomination (Graph 5). The most plausible explanation is that the \$50 denomination is a relatively high-value banknote and, representing almost half of all banknotes on issue, is widely used and accepted. While the \$100 denomination offers counterfeiters a greater return for each counterfeit produced, the risks of detection and prosecution are higher because \$100 banknotes are not as widely circulated and are, therefore, likely to be scrutinised more closely by the public.

Australia's experience in this regard is not dissimilar to the experience internationally. In most countries, counterfeiters tend to target denominations that have a relatively high value but are also widely circulated. Indeed, countries in which the most circulated banknote accounts for a very large share of banknotes in circulation typically observe that counterfeits are disproportionately concentrated in that denomination (Graph 6).

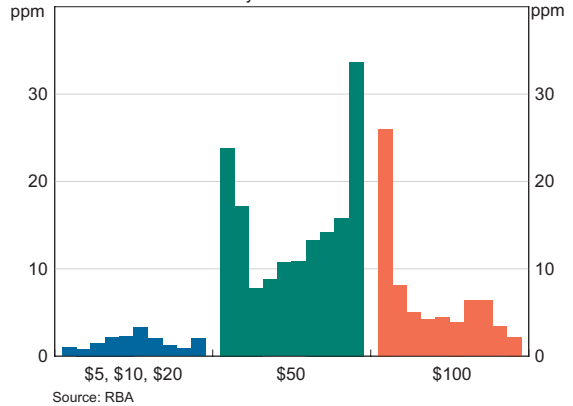
The Importance of Public Confidence

Given the importance of currency as a medium of exchange and store of wealth, it is important that counterfeiting rates are low and that the public has confidence in the integrity of the currency. If counterfeiting rates are high enough to cause consumers and businesses to become concerned about the likelihood of receiving a counterfeit, they are likely to adjust their behaviour when accepting banknotes, leading to potentially significant costs to the community. For example, businesses may take considerably more time verifying the banknotes they receive, thereby increasing transaction costs. Businesses may also need to invest in counterfeit-detection equipment and spend additional time training their staff in counterfeit detection. In more

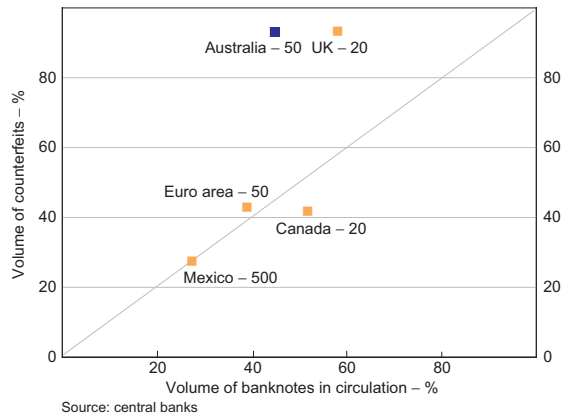
Graph 4
Annual Counterfeiting Rates
Parts per million genuine banknotes



Graph 5
Counterfeits by Denomination
Ten years to 2010/11



Graph 6
Circulation and Counterfeiting Volumes
Per cent of total



extreme circumstances, public confidence could erode to the point that consumers switch from using banknotes to alternative payment mechanisms.

If a counterfeiting threat were sufficiently serious to warrant the replacement of a banknote series, the costs borne by the currency issuer – including the development, production and issuance of new banknotes – would also be significant. The community would also bear the cost of upgrading equipment that accepts, dispenses and processes banknotes.

The Role of the Reserve Bank

Because of the potential costs to the community, the Reserve Bank has established a number of strategies to minimise the risks of counterfeiting and maintain public confidence in Australian banknotes. These strategies fall into four broad categories: research into banknote security; maintenance of the quality of banknotes in circulation; community engagement; and liaison with law enforcement agencies.

Banknote research

Australia's current banknote series, which was introduced in the mid 1990s, incorporates a number of security features (Box A). These features serve two functions: to provide the public with the means to readily authenticate their banknotes, and to make the banknotes relatively difficult for a counterfeiter to successfully copy. Given rapid improvements in reprographic technology over the past decade, the Reserve Bank devotes significant resources to keeping abreast of developments in technology and banknote security features.

The Reserve Bank has a substantial research program aimed at assessing and developing new security features that could be incorporated into future banknote designs. Given the specialist and highly technical nature of this development work, it often involves collaboration with other entities, including research institutions and universities. The Reserve Bank is also involved in a number of international

initiatives aimed at combating counterfeiting, including the Central Bank Counterfeit Deterrence Group (CBCDGD), a working group of 32 central banks and banknote printing authorities. The CBCDGD monitors and investigates emerging threats to the security of banknotes. In particular, the CBCDGD supports, develops and deploys technologies designed to deter the use of digital equipment to produce counterfeits.

Banknote quality

The Reserve Bank also has a program aimed at maintaining a high quality of banknotes in circulation, in order to not only improve the functionality of circulating banknotes, but to make it harder to successfully pass counterfeits into circulation. Overseas studies have shown that the public finds it harder to accurately distinguish between a worn (poor-quality) banknote and a counterfeit than between a new (good-quality) banknote and a counterfeit (Klein, Gadbois and Christie 2004). Furthermore, if the quality of banknotes in circulation is highly variable (with some very worn and others relatively new), the public may become indifferent to variations in banknote quality and more likely to accept a counterfeit as simply being a poor-quality banknote.

Community engagement

Another element of the Reserve Bank's strategy is public education on how to detect counterfeits. The Bank's website provides information on the design and features of Australian banknotes and counterfeit detection. The Bank also produces and distributes counterfeit detection guides to organisations such as banks, retailers and fast food outlets, and gives presentations on banknotes to groups including schools, retailers, community groups and law enforcement agencies. While having secure and good-quality banknotes in circulation makes it harder for counterfeiters to produce and successfully pass counterfeits, it is not possible to prevent counterfeiting altogether. For this reason, the public

also needs to be familiar with the security features on banknotes, so that any counterfeits are readily identified and removed from circulation. In addition, in the event of a counterfeiting attack, the Reserve Bank would need to ensure it has the capability to communicate effectively with the public in order to contain the impact of the threat on public confidence. Overseas experiences have shown that even countries that have traditionally experienced low counterfeiting rates are susceptible to a sharp deterioration in public confidence, notwithstanding that the counterfeiting incidents might be relatively minor. Hence, as do other central banks, the Reserve Bank devotes substantial resources to ensure public access to information about banknotes.

Law enforcement

The fourth element of the Reserve Bank's strategy is to assist law enforcement to deter and prosecute counterfeiters. Under the *Crimes (Currency) Act 1981*, it is an offence to produce, pass or possess counterfeit banknotes in Australia, with maximum penalties ranging between 10 and 14 years' imprisonment and fines of up to \$75 000. While the Reserve Bank does not have any investigative powers, it works closely with state, territory and federal law enforcement agencies, assisting them to identify counterfeiting threats quickly and providing forensic support.

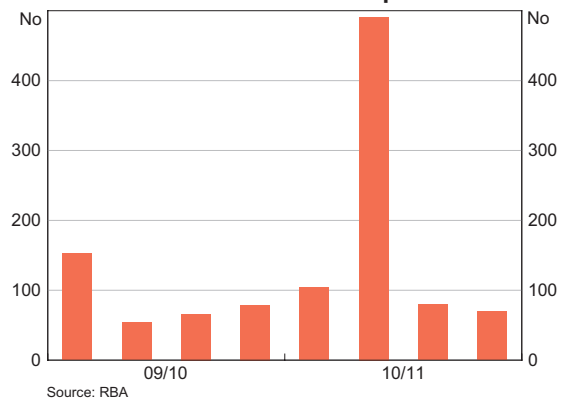
All counterfeits discovered in Australia, whether detected in circulation or seized by police before entering circulation, are inspected by the Reserve Bank's counterfeit examiners. In addition, the Reserve Bank supports police investigations into counterfeiting. The Reserve Bank's counterfeit examiners regularly provide police with technical advice on manufacturing techniques and materials used by counterfeiters. The counterfeit examiners also provide expert witness statements for use in court and have testified in cases involving Australian and foreign banknotes.

Recent Experience

Although over recent years counterfeiting rates have been low, the Reserve Bank continues to closely monitor counterfeiting activity in Australia and respond quickly to public enquiries. There was a significant increase in counterfeit-related enquiries late last year, due to an email being circulated that contained incorrect advice about how to identify counterfeits, rather than in response to any specific counterfeiting event (Graph 7). The email in question incorrectly indicated that banknotes without the name printed under the portrait, or with the signature of the Governor of the Reserve Bank below the signature of the Secretary to the Treasury, were counterfeit. These differences reflect minor design changes that were made to Australian banknotes in 2002. The presence or absence of printed names, and the order of the signatures, cannot be used to establish the authenticity of a banknote; there are genuine banknotes in circulation with printed names, and genuine banknotes without printed names.

The extent of the anxiety generated by the email prompted the Reserve Bank to post a warning on its website in late November.¹ Following the publication of this warning, and the related media coverage, the number of counterfeit-related

Graph 7
Counterfeit-related Enquiries



¹ See <<http://www.rba.gov.au/banknotes/counterfeit/banknotes-scam.html>>.

Box A

Australian Banknote Security Features

1 Plastic Banknote

Australian banknotes are printed on plastic, which means they have a distinct feel and it is difficult to start a tear along the edge. A plastic banknote 'scrunched' in the hand should return to its original form.

2 The Clear Window

The clear window should be part of the banknote and the white image printed on the window should not be easily rubbed off. The window should also contain a clear embossed image – a wave pattern on \$10 banknotes, and the value of the banknote on \$20, \$50 and \$100 banknotes.

3 The Coat of Arms

When the banknote is held up to the light, the Australian Coat of Arms should be visible.

4 The Federation Star

Diamond-shaped patterns are printed inside a circle on both sides of the banknote. When the banknote is held up to the light, the patterns should line up perfectly to form the seven-pointed Federation star.

5 The Distinct Feel of the Printing

A special raised ink gives the banknote a distinctive feel.

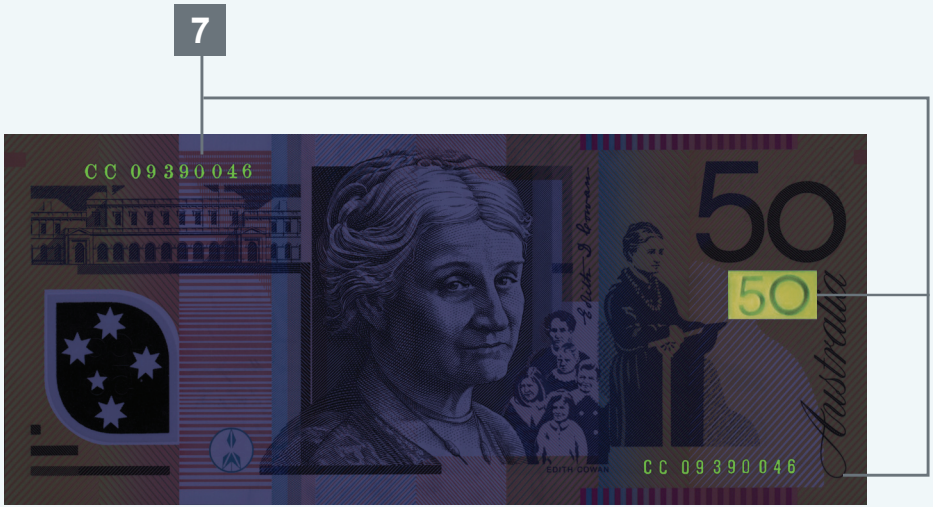
6 Print Quality/Microprinting

The background printing should be sharp. In particular, micro-printed text should be clearly visible under a magnifying glass.

7 Fluorescent Properties

With the exception of the serial numbers and designated UV patches, the banknote should not fluoresce under a UV light.

Additional information about the security features on Australian banknotes can be found at <http://www.rba.gov.au/banknotes/counterfeit/security.html>.



RECENT TRENDS IN COUNTERFEITING

enquiries quickly returned to levels consistent with previous experience.

Summary

Counterfeiting rates in Australia continue to be low in both an absolute sense and relative to rates experienced overseas. As a result, public confidence in Australia's banknotes remains high. Historical experience in Australia and overseas shows, however, that counterfeiting rates can increase sharply in a short space of time and, even when there is little cause for concern, public confidence can be easily reduced by incorrect information. For these reasons, the Reserve Bank continues to review and develop its strategies aimed at minimising the risks of

counterfeiting and maintaining public confidence in banknotes. ↗

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Still Interesting Times

Glenn Stevens, Governor

Address to the Chamber of Commerce and Industry (Western Australia) and the Chamber of Minerals and Energy (Western Australia) Corporate Breakfast
Perth, 7 September 2011

It is very good to be with you this morning.

In the process of deciding a title for this address, I recalled that three years ago I was talking in public addresses about the times being interesting, perhaps a little too interesting. That still seems to be the case, hence the title.

As you know, yesterday the Reserve Bank Board met here in Perth. The Board reviewed the international and local information to hand since its last meeting, and decided once again to leave the cash rate unchanged.

The reasons for that decision were given in the statement released following the meeting. More information on the nature of the discussion and considerations the Board took into account will be published in the minutes of the meeting, two weeks from yesterday. I do not want to dampen any of your undoubted eager anticipation for what may be contained in those minutes. What I will do is say a little more about the sequence of decisions the Board has taken over recent months.

To do that in appropriate context, it is worthwhile first recounting the framework for monetary policy that has been in operation since the early 1990s and that continues to guide the decisions of the Board. So I will say something about that. Then I will describe how the flow of recent events, viewed through that framework, has had a bearing on decisions.

The Framework for Monetary Policy

The framework for monetary policy is a medium-term, flexible inflation target. It seeks to achieve a rate of increase in the Consumer Price Index of

between 2 and 3 per cent, on average, over time. This arrangement has a fair bit of history now. The Reserve Bank began to articulate it in the early 1990s and it has been formally agreed between successive Treasurers and Governors, in published statements, beginning in 1996.¹ The 'on average' specification allows the Bank to take account of the fact that it cannot finetune inflation over short periods, and of the obligation to promote, insofar as monetary policy can, full employment, which is another of the Bank's charter obligations. Having a numerical goal takes account of the importance of inflation expectations, and seeks to provide an anchoring point for them – which is a critical function of any monetary policy regime. It also provides a focal point and a measuring stick for monetary policy decisions, which recognises that, in the end, monetary policy is really about the value of money.

We arrived at this framework after a long search – the 'search for stability' set out in detail by Ian Macfarlane in his ABC Boyer Lectures in 2006.² The current framework is not necessarily the end of history. But it has worked well for a period not far short of two decades now, with no obviously superior framework on offer.

Sometimes people ask whether a higher target for inflation might not be better, particularly when inflation is looking like it will rise and the Bank is running a setting of monetary policy designed to

1 The first such statement was between Treasurer Costello and Ian Macfarlane in August 1996. We are now up to the fifth incarnation of this agreement. See <<http://www.rba.gov.au/monetary-policy/framework/stmt-conduct-mp-5-30092010.html>>.

2 Macfarlane I (2006), *The Search for Stability*, Boyer Lectures 2006, ABC Books, Sydney.

STILL INTERESTING TIMES

resist that. The answer ultimately hinges on how prepared we would be to accept the things that would go with higher inflation. Higher average interest rates would be among them – there is no reason that savers, any more than wage earners, would be prepared simply to accept an erosion of their financial position. That is why countries with higher inflation generally have higher nominal interest rates. Moreover, whatever structural challenges the economy faces would still have to be faced at higher inflation rates. Higher inflation wouldn't make those issues go away, nor make them any easier to cope with (as we know from our own history when inflation was high and structural change still had to occur). We would simply waste more real resources as everyone sought to protect themselves from the higher inflation.

In supporting the decision process that puts this framework into practice, the Bank carries out a great deal of detailed statistical work, tracking several thousand individual data series. It conducts extensive liaison with businesses and other organisations, usually speaking in detail to as many as 100 contacts each month. It produces voluminous published analysis of these data.

The objective of these efforts is, at its heart, fairly simple. We are trying to form an assessment about the course of overall demand in the economy and how it is travelling in relation to the economy's supply potential. That assessment in turn informs a judgement as to whether inflation pressure in the economy is likely to increase, decrease or stay about the same, and how the likely outcomes compare with the announced objective. That judgement then informs a decision as to whether monetary policy needs to restrain demand, to support it or to be 'neutral'. Of course other factors that affect prices – like exchange rate changes, changes in the price of oil, and so on – have to be taken into account as well.

Note that the economy's supply potential is a key element in the above framework. This is not a directly observable thing: there is no time series labelled 'potential supply'. Assumptions have to be

made about the availability of productive factors – labour and capital – and about the productivity with which these factors can be used. This is why the current productivity discussion is so important. Incidentally, the desire for more productivity is *not* a call for working harder. Australians already work pretty long hours by international standards. Productivity per hour, which is what counts, is not improved by adding more hours, but by finding ways of making the hours that are already being contributed more effective.

The Board's decision each month, and the reasoning behind it, are communicated to the public. These statements are among the most closely scrutinised documents in the country. I am often awed by the layers of hidden meaning that people are able to detect in them. But the main purpose of these statements, and of all the other communication we do, is simply to try to make the Bank's assessment of the outlook and its actions as understandable as possible to the many people who need to make long-term decisions, including households and businesses. Of course, events and new information often change the outlook, as we have seen recently.

Recent Developments

How has the Board evaluated recent developments within the above framework?³

Throughout the past year or so, the forecasts that the Bank's staff have provided to the Board have suggested that underlying inflation would probably stop falling and then gradually rise through the three-year forecast period. The backdrop to this view was that the rise in the terms of trade was expansionary for incomes and investment, which would likely see demand growth remain pretty strong even as fiscal stimulus spending unwound.

The exchange rate was working to offset a good deal of this expansionary impact, by restraining some

³ The Deputy Governor recently gave a very good account of this in more detail than I can attempt here today. See Battellino R (2011), 'The RBA's Thinking on the Economy over the Past Year', *RBA Bulletin*, September, pp 89–92. Available at <<http://www.rba.gov.au/speeches/2011/sp-dg-230811.html>>.

parts of the economy exposed to international trade but not exposed to mining. Nonetheless, given the size of the terms of trade rise, and the fact that the economy started from a position of reasonably low unemployment, it was thought that underlying inflation was more likely to start to go up than to keep falling. On the evidence we have so far, that's what seems to have been happening.

Faced with that outlook, the Board judged that it was appropriate for monetary policy to exert a degree of restraint. As of the end of last year, the Board's view was that it had reached that position. We believed that we were therefore in a position of being able to maintain a steady setting for a while. The post-Board statements I issued each month at successive meetings said that the Board viewed the stance of monetary policy as remaining appropriate for the outlook.

Of course, there are always uncertainties surrounding forecasts, and the Bank's publications have been careful to articulate possible risks that we could identify – including things such as the possibility of a serious worsening of the situation in international financial markets, driven by sovereign debt concerns. Most of these risks do not come to pass, and if they do eventuate they don't necessarily unfold as we had imagined they might. Still, the Bank makes considerable efforts to think about how things could turn out differently to the central forecast.

By the time of the May Board meeting, there was evidence that the pace of underlying inflation had started to pick up. I myself felt that the Board was still well placed to sit still at that time. We had already put in place a response in advance of the expected pick-up in inflation and it is not necessarily always wise to respond to one high (or low) figure. Nonetheless, the updated forecasts carried a fairly clear message: policy would probably need to be tightened further, at some point, if things continued to evolve as expected. The Bank said that – indeed there was no other credible thing we could have said.

In the ensuing months, little has changed about the outlook for resources sector investment. More large projects have been approved and the pipeline of future investment looks very large. On all the available information, resources sector investment will probably rise by another 2 percentage points or more of annual GDP over the next couple of years. Prices for important commodities remain high and the nation's terms of trade are at an all-time high in the current quarter.

At the same time, it has become clearer that precautionary behaviour by households and some firms is exerting restraint on the pace of growth in demand, and that the higher exchange rate is diverting more demand abroad. This is putting pressure on trade-exposed sectors. Moreover, the sense that a higher exchange rate might not just be a temporary phenomenon may be leading to a pick-up in the pace of structural change in the economy.

In net terms, the outlook for the non-resources economy in the near term is weaker than it looked a few months ago, and the recovery of flood-affected mining in Queensland is taking longer than earlier thought. At the same time, looking at financial variables, credit growth has slowed a bit further and asset prices have tended to decline. These factors, along with ongoing evidence that underlying inflation had turned up, were incorporated in the Bank's outlook as published early last month.

Meanwhile, the sense of unease about how Europe will manage its problems has increased over recent months. We also had the anxiety over the US debt ceiling issue, which became acute early in August. Measures of confidence in both economies declined significantly as all this occurred. Equity markets fell as investors shifted to the relative safety of bonds issued by the major countries – even though S&P had announced a downgrade of the US sovereign credit rating.

It is too soon to see much evidence of a concrete impact of these events on the global economy. Any assessment we make at present is highly preliminary.

STILL INTERESTING TIMES

Moreover, we have no way of knowing what events will transpire in financial markets over the months ahead. There are any number of hurdles in Europe or the United States that could serve as a catalyst for increased anxiety. This state of affairs is likely to persist for the foreseeable future.

With those caveats, a few preliminary observations can be offered on this episode in comparison with what we saw in 2008.

First, the focus is more on sovereign creditworthiness as opposed to the state of private bank balance sheets *per se* (though in Europe of course the two are intertwined). In a proximate sense, that is the direct result of the previous crisis and especially the ensuing period of weak growth that has had a severe impact on government revenues in the affected countries. But, taking a longer-term perspective, some countries, especially in Europe, have had fiscal positions that were quite vulnerable to a shock to confidence for some time now. High debt levels were sustainable while markets thought they were and hence were prepared to offer financing at low interest rates; if people suddenly doubt sustainability and charge high interest rates, that same position becomes much less sustainable. So to no small extent, it is actually a matter of confidence – confidence that there is a sustainable long-run fiscal path, that policymakers know how to get onto it, and that they have the will to do so. In crafting any policy response to near-term economic weakness, this is a key point.

Second, there have been pressures in funding markets for some European banks recently, but at this point not to the same extent as in October 2008. Bank capital levels are improved from three years ago and leverage is reduced. We have not seen significant funding problems for US or UK banks recently; their problems at present seem to relate more to the possible size of legal costs arising from pre-crisis lending standards. Overall, we have not, to this point, seen the widespread withdrawal of willingness to deal with counterparties that we saw in late 2008.

Third, a key feature of this episode is that confidence in the euro is a more prominent issue than was the case three years ago. Those countries at the so-called ‘periphery’ are paying a high price as they play their part in keeping the euro together. But the ultimate outcome is going to hinge on the willingness of ‘core’ euro countries to accept socialisation across the euro zone of some of the losses associated with countries in trouble. That is really the issue that is being debated in Europe now.

If there were a major international downturn, an important question would be how policymakers in major countries would respond. The scope for fiscal policy easing in many major countries is hotly debated. Some commentators call for further stimulus, citing faltering recoveries, while others point to medium-term debt paths that look very troubling as a reason for fiscal consolidation. Both have a point. The question in major countries is whether a package combining short-term stimulus with a highly credible medium-term path back to sustainability could be crafted. It certainly does not look easy. As for possible monetary policy responses, most major countries would be quickly into the realm of ‘quantitative methods’, if they are not there already. It is hard to gauge the effects of those measures.

In Asia and other parts of the emerging world, however, ample policy ammunition is available, both fiscal and monetary, should the authorities have a need to use it. To do so credibly would presumably require confidence that the upward trend in inflation seen over the past couple of years would be likely to turn down. Of course, a significant weakening of the global economy would result in lower commodity prices and generally lower underlying inflation pressures. So far, the decline in major commodity prices has been fairly modest, though enough to help rates of CPI inflation to moderate a little.

In summary, the environment presents no shortage of challenges, though we should not assume that this is necessarily 2008 all over again. It is reasonable to conclude, at this point, that the outlook for global

growth is not as strong as it looked three months ago. Forecasters are generally revising down global growth estimates for 2011 and 2012, mainly as a result of weaker outcomes for the major countries.

Turning back to the implications for Australia, periods of sudden increases in anxiety within international financial markets are moments when, if at all possible, it is good to be in a position to be able to maintain steady settings. In the recent few meetings, the Board has judged it prudent to sit still, even though we saw data on prices that were, on their face, concerning. To be in that position of course requires timely decisions to have been made in earlier periods.

Looking ahead, the task for the Board is to assess what bearing recent information, and recent international and local events, will have on the medium-term outlook for demand and inflation. They probably won't have much effect on the large-scale investment plans in the resources sector, but households and firms watching what is happening may continue their precautionary behaviour for longer than otherwise. This would presumably dampen demand somewhat compared with the outlook set out in the *Statement on Monetary Policy* published in early August; it may also condition wage bargaining and price setting. If so, that may act to curtail the upward trend in inflationary pressures that has, up to this point, appeared to be in prospect.

At the same time, significant rises in a range of administered prices are still set to occur over the period ahead. Moreover, unit costs have been rising quite quickly given the fairly poor performance of multi-factor productivity growth over recent years. In fact the experience of the past year, as the Deputy Governor noted recently, is that while growth seems to be turning out weaker than expected at the end of last year, underlying inflation seems to be turning out higher. A key question is whether that is just the vagaries of statistical noise and lags, or whether it is telling us that the combinations of growth and inflation available to us in the short term are less attractive than they seemed a few years ago. If

the latter, the spotlight will come back on to supply-side issues.

Conclusion

More than at most times in my professional life, Australia's economy faces a very unusual, and powerful, set of complex forces. Major countries are still coming to terms with the excesses of earlier years and experiencing what many have learned before, which is that after a period of financial distress it is usually a long and difficult recovery. Economic growth has been uneven and patchy, and financial concerns keep recurring, with waves of positive and negative sentiment sweeping global markets. Australians feel the effects of those swings in sentiment.

Meanwhile, the emerging world continues to expand, and it is not all due simply to exports to the rich world, even though the world could still do with some more rebalancing. There is an epochal change occurring, and Australians are also feeling that. It is overwhelmingly positive for us in net terms, even if our tendency to dwell on the downside is more prominently on display at present.

The future is uncertain, but it always is. What we know is that, as we move into that future, whatever it holds, we do so:

- with our terms of trade at a record high;
- with more jobs in the economy than ever before, and with 95 out of every 100 people seeking work in a job;
- with our banks sound, our financial system stable and our sovereign credit respected globally; and
- with the capacity for macroeconomic policy to respond sensibly to events, appropriately guided by well-established frameworks.

We have our problems, but with some good sense and careful judgement we ought to be able to navigate what lies ahead. ✦

The Cautious Consumer

Glenn Stevens, Governor

Address to The Anika Foundation Luncheon

Supported by Australian Business Economists and Macquarie Bank

Sydney, 26 July 2011

Thank you for coming out once again in support of the Anika Foundation.¹ I want also to thank in particular Macquarie Bank and the Australian Business Economists for their continuing support of this annual series.

In last year's Anika Foundation address, I talked about the fiscal difficulties being faced by governments of some of the world's largest countries in the wake of the financial crisis. A theme of that talk was that a number of major advanced economies had been facing for a while the need to address long-term structural issues in their fiscal accounts. In large part these stemmed from the inevitable collision of long-run trends in demographics and entitlements. A deep recession and the prospect of a slow recovery have brought forward the pressure to face these issues.

Over the past year, we have seen the focus on fiscal sustainability continue to increase. The problems have been most acute in Greece, though unfortunately not confined to it. Greece is a small country that has nonetheless assumed considerable significance. The citizens of Greece are now experiencing an austerity regime of historic proportions, which is a pre-condition for access to the foreign official funding that will allow them to meet their near-term obligations. But the longer-term solution surely will involve the taxpayers of Europe accepting part of the costs of restoring

Greece to sustainability. The recent agreement appears to be a further step in that direction, with risk being shifted from the private sector onto the European public sector. I would view this as a step on the road to an eventual solution, though European policymakers continue to face a very delicate task in preserving the combination of fiscal sustainability and the single currency.

Concerns about the US fiscal position have also increased, though this has not been reflected, at this point, in market prices for US debt. The immediate need is for the US authorities to lift the debt ceiling, then for them to work towards longer-term sustainability.

In both the US and European cases, the process of allowing things to go right to the brink of a very disruptive event before an agreement is reached on the way forward has been a source of great uncertainty and anxiety around the world.

That anxiety has extended to Australia, even though, as I am sure people are sick of hearing me say, Australia is in the midst of a once-in-a-century event in our terms of trade. I won't recite the facts yet again. Suffice to say that this is, at least potentially, the biggest gift the global economy has handed Australia since the gold rush of the 1850s.

Yet it seems we are, at the moment, mostly unhappy. Measures of confidence are down and there is an evident sense of caution among households and firms. It seems to have intensified over the past few months.

¹ The Anika Foundation supports research into adolescent depression and suicide. See <<http://www.anikafoundation.com/>>.

There are a number of potential factors to which we can appeal for an explanation of these recent trends. The natural disasters in the summer clearly had an effect on confidence, for example. Interest rates, or intense speculation about how they might change, are said to have had an impact on confidence – even after a period of more than a year in which the cash rate has changed only once, the most stable outcome for five years. Increasingly bitter political debates over various issues are said by some to have played a role as well. The global outlook does seem more clouded due to the events in Europe and the United States. We could note, on the other hand, that the Chinese slowdown we have all been anticipating seems to be relatively mild so far – that country has continued to expand at a pretty solid pace as measured by the most recent data. But these days, mention of the Chinese expansion reminds people that the emergence of China is changing the shape of the global economy and of the Australian economy. And structural change is something people rarely find comfortable in the short term, even though a capacity to adapt is a characteristic displayed by the most successful economies.

So the description of consumers as ‘cautious’ has become commonplace. It is not one I disagree with. Indeed the RBA has made such references on numerous occasions over the past couple of years.

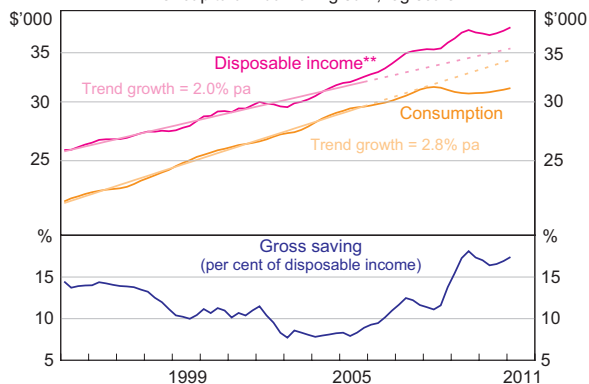
Nor do I wish to dismiss any of the concerns that people have. People want to make sense of the disparate information that is coming at them.

I want to suggest that to do that – to make sense of it all – it is worth trying to develop a longer-run perspective, particularly in the area of household income, spending, and saving. That is my task today.

I have two charts that I think help us to understand the story.

These figures are from the quarterly national accounts (Graph 1). The top panel shows the level of household disposable income, and household consumption spending. Income as shown here takes account of taxes, transfers and household

Graph 1
Real Household Income and Consumption*
 Per capita annual rolling sum, log scale



* In 2008/2009 dollars; deflated using the household final consumption expenditure implicit price deflator
 ** Disposable income is after tax and net interest payments
 Sources: ABS; RBA

interest payments. Both series are measured in real per capita terms, and shown on a log scale. In the lower panel is the gross household saving ratio, which is of course the difference between the other two lines expressed as a share of income.²

Also shown is a trend line for each of the income and consumption series, estimated using ordinary least squares, over the period 1995–2005. The trend is then extrapolated for the 21 quarters since the end of 2005.

Notice that the trend growth for real per capita household income over the period 1995 to 2005 was 2.0 per cent per annum. That’s a pretty respectable rate of growth for an advanced country. It was more than double the growth rate seen in the preceding two decades from 1975 to 1995. Growth at that pace means that the average real income doubles about every 35 years.

Notice also that the trend line for consumption was steeper than that for income over the same period. These two lines were on their way to meeting. Real per capita consumption growth averaged 2.8 per cent per annum. This was a full percentage point higher than in the preceding 10-year period, and

2 The measure here differs from the commonly cited net saving rate, which deducts an estimate of depreciation of the stock of fixed assets (such as dwellings) owned by households.

similar to the sorts of per capita growth rates for consumption seen in the late 1960s and early 1970s.

For 10 years up to 2005, then, consumption growth outpaced income growth, which was itself pretty solid, by three-quarters of a percentage point, on average, every year. In fact this convergence of income and consumption was the continuation of a trend that had already been in place for about a decade. As the bottom panel shows, the flow of saving fell as a share of income.

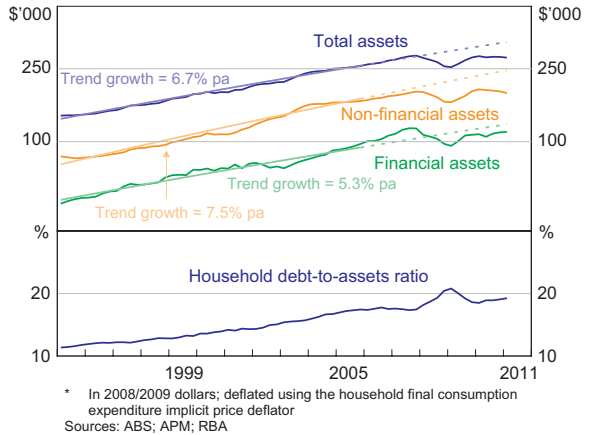
As you can see, things began to change after that. From about 2006, real per capita income began to grow faster. Over the five years to the end of 2010, it rose by 2.9 per cent per annum. It may not be entirely coincidental that that period is when the terms of trade really began to rise in earnest.

Yet from about the end of 2007, even as income was speeding up, household consumption spending *slowed down*. In per capita terms, real consumption today is no higher than three years ago. It's no wonder that people are talking about consumer caution, and no wonder that retailers are finding things very tough indeed. Coming after a period in which real consumption had risen by 2.8 per cent a year for a decade, and had outpaced income growth for two decades, no net growth in consumption for three years is quite a big change.

But these figures suggest that lack of income growth is not the reason for lack of consumption growth. It's not that the income is not there, it's that people are choosing, for whatever reason, not to spend it in the same way as they might have a few years ago.

Why is that? To find an answer we need to look to the financial accounts of the household sector. It is now time to introduce the second chart (Graph 2). It shows gross household assets, also measured per capita, in real terms (i.e. deflated by the consumption deflator). The two components are financial assets (including superannuation assets) and non-financial assets, the bulk of which is dwellings. These data say that gross assets across Australian households presently average about \$800 000 per household, or about \$300 000 per capita.

Graph 2
Real Household Assets*
Per capita, log scale



Between 1995 and 2005, assets rose at an average annual pace of 6.7 per cent in real, per capita terms. Completely comparable figures for earlier periods are hard to come by. But it's pretty clear that this increase stood out.

Using the Treasury's series for private wealth, from 1960 to 1995 the annual average per capita rate of increase in total wealth, in real terms, was 2.6 per cent. That is, it was broadly similar to the per capita growth rate of real GDP, which is what one would expect. So the growth from 1995 to 2005 was at a pace well over double the average of the preceding three or four decades. A large part of the additional growth was in the value of dwellings. The extent of leverage against the dwelling stock also tended to increase, with the ratio of debt to total assets rising from 11 per cent at the start of 1995 to around 17½ per cent by the end of 2005. It has tended to rise a little further since then.

Had we really found a powerful, hitherto unknown route to genuine wealth? Or was this period unusual?

Looking back, it appears the latter was the case. In 2008, the trend changed. Real assets per person declined for a period during the financial crisis. Given the nature of that event and the potential risks it presented, that is not surprising. Real asset prices have since risen again but, so far, have not resumed the earlier trend rate of increase, and at this stage

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they show no signs of doing so. They look very much like they are on a much flatter trend.

This adjustment has been considerably less abrupt than those seen in some other places. Nonetheless, it is a very substantial change in trend. If people had been banking on a continuation of the earlier trend, they would be feeling rather disappointed now. Of course if that earlier trend in gross wealth owed something to a tendency to borrow to hold assets, then a continuation would have exposed households to increased risk over time.

Casual observation suggests that this change of trend in the growth of assets, or 'wealth', roughly coincided with the slowing in consumption spending relative to its earlier very strong trend. It seems fairly clear that these financial trends and the real consumption and saving behaviour of households were closely connected.

I would argue that the broad story was as follows. The period from the early 1990s to the mid 2000s was characterised by a drawn-out, but one-time, adjustment to a set of powerful forces. Households started the period with relatively little leverage, in large part a legacy of the effect of very high nominal interest rates in the long period of high inflation. But then, inflation and interest rates came down to generational lows. Financial liberalisation and innovation increased the availability of credit. And reasonably stable economic conditions – part of the so-called 'great moderation' internationally – made a certain higher degree of leverage seem safe. The result was a lengthy period of rising household leverage, rising housing prices, high levels of confidence, a strong sense of generally rising prosperity, declining saving from current income and strong growth in consumption.

I was not one of those who felt that this was bound to end in tears. But it *was* bound to end. Even if one holds a benign view of higher levels of household debt, at a certain point, people will have increased their leverage to its new equilibrium level (or, if you are a pessimist, beyond that point). At that stage, debt growth will slow to be more in line with income,

the rate of saving from current income will rise to be more like historical norms, and the financial source of upward pressure on housing values will abate. (There may be other non-financial forces at work of course.)

It is never possible to predict with confidence just when this change will begin to occur, or what events might potentially trigger it. But an international financial crisis that envelops several major countries, which has excessive borrowing by households at its heart, and which is coupled with a major change in the global availability of credit, is an event that would be likely to prompt, if nothing else did, a reassessment by Australian households of the earlier trends. It would also prompt a re-evaluation by financial institutions of lending criteria. This is precisely what has occurred over recent years.³

What are the implications of these changes?

An important one is that, as I said at a previous Anika Foundation lunch two years ago, the role of the household sector in driving demand forward in the future won't be the same as in the preceding period.⁴ The current economic expansion is, as we all know, characterised by a very large build-up in investment in the resources sector and expansionary flow-on effects of that to some, but not all, other sectors of the economy. It is certainly *not* characterised by very strong growth in areas like household

3 I am conscious that this explanation has not made explicit reference to demographics – in particular the decisions of 'baby boomers' in the years leading up to their planned retirements. No doubt these factors also played a role. But there is enough complexity to grapple with here already for today's purposes. I have spoken before about population ageing and finance. See Stevens G (2005), 'Finance and the Ageing Population', *RBA Bulletin*, December, pp 9–16. Available at <<http://www.rba.gov.au/speeches/2005/sp-dg-161105.html>>.

4 '... the prominence of household demand in driving the expansion from the mid 1990s to the mid 2000s should not be expected to recur in the next upswing. The rise in household leverage, the much lower rate of saving out of current income, and the rise in asset values we saw since the mid 1990s, are far more likely to have been features of a one-time adjustment, albeit a fairly drawn-out one, than of a permanent trend. Moreover the risks associated with those trends going too far are apparent from events in other countries. These risks have been reasonably contained so far in Australia – but it would be prudent not to push our luck here.' See Stevens G (2009), 'Challenges for Economic Policy', *RBA Bulletin*, August, pp 10–16. Available at <<http://www.rba.gov.au/speeches/2009/sp-gov-280709.html>>.

consumption that had featured prominently in the preceding period.

That is partly because the change in the terms of trade, being a relative price shift, will itself occasion structural change in the economy: some sectors will grow and others will, relatively speaking, get smaller. That is particularly the case if the economy's starting point is one that is not characterised by large-scale spare capacity.

But those pressures for structural change are also coinciding with changes in household behaviour that are associated with the longer-run financial cycles I have just talked about. Just as some sectors are having to cope with the effects of changes in relative prices – manifest to most of us in the form of a large rise in the exchange rate – some sectors are also seeing the impacts of a shift in household behaviour towards more conservatism after a long period of very confident behaviour.

It would be perfectly reasonable to argue that it is very difficult for everyone to cope with both these sets of changes together – not to mention other challenges that are in focus at the same time. However, if we were to think about how things might have otherwise unfolded – if households had been undergoing these shifts in saving and spending decisions *without* the big rise in income that is occurring, to which the terms of trade have contributed – it is very likely that we would have had a considerably more difficult period of adjustment.

What then about the future? Can we look forward to a time when these adjustments to household saving and balance sheets have been completed? We can. To return to the first of my two charts, the current divergent trends between income and consumption spending are no more sustainable than the previous trends ultimately were. At some point, the two lines are likely to stop moving apart. That is, the saving rate, debt burdens and wealth will at some stage reach levels at which people are more comfortable, and consumption (and probably debt) will grow in line with income, with a relatively steady saving rate. We could then reasonably expect to

see consumption record more growth than it has in the past few years. After all, it is very unusual for real consumption per person not to grow.

We cannot really know, of course, when that might happen. Doubtless it will depend on what else is occurring. We can note that the rise in the saving rate over the past five years has been much faster than its fall was in the preceding decade. In fact it is, at least as measured, the biggest adjustment of its kind we have had in the history of quarterly national accounts data. So the adjustment in behaviour to what should be a more sustainable relationship between spending and income has in fact proceeded pretty quickly (which is presumably why it has become such a prominent topic of discussion). That in turn means that the time when more 'normal' patterns of consumption growth recur is closer than it would have been with a more drawn-out adjustment. Viewed in long-run perspective, it is not unreasonable for a nation to save a good deal of a sudden rise in national income conferred via a jump in the terms of trade, until it becomes clearer how persistent that new level of income is. As a better sense of the degree of persistence is gained, people will probably be more confident to spend than perhaps they are just now. It is entirely possible that, were some of the current raft of uncertainties to lessen, the mood could lift noticeably, so I don't think we need to be totally gloomy.

But what is 'normal'? Will the 'good old days' for consumption growth of the 1995–2005 period be seen again?

I don't think they can be, at least not if the growth depends on spending growth outpacing growth in income and leverage increasing over a lengthy period. A rapidly rising saving rate isn't normal, but nor is a continually falling one. While the rise in the saving rate has been unusually rapid, the *level* of the saving rate we have seen recently looks a lot more 'normal', in historical perspective, than the much lower one we saw in the middle of last decade.

A return to those earlier sorts of growth rates for consumption would instead require, and could only

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really be sustainably based on, a continuation of the faster pace of income growth we have seen since about 2006. To the extent that that income growth has been a result of the increase in the terms of trade, however, it probably won't be sustained at the same pace. The *level* of income will probably stay quite high – above the level implied by the earlier trend – unless the terms of trade collapse. But the *rise* in the terms of trade has probably now come to an end. So the *rate of growth* of per capita income could be expected, all other things equal, to moderate from its recent unusually strong performance.

If we want to sustain the *rate of growth* of incomes, and hence lay the basis for a return in due course to the sorts of growth of spending seen in the golden period of 1995–2005, we will have to look elsewhere. As everyone in this room would know, there is only one source of ongoing higher rates of growth of real per capita incomes, and that is higher rates of

growth of productivity. Everyone here also knows that it is now just about impossible to avoid the conclusion that productivity growth performance has been quite poor since at least the mid 2000s.

So everything comes back to productivity. It always does. It has been observed before that past periods of apparently easy affluence, conferred by favourable international conditions, probably lessened the sharpness of our focus on productivity. Conversely, the will to reform was probably most powerful when the terms of trade reached a long-term low in the mid 1980s. Those reforms ushered in a period of strong productivity growth.

The thing that Australia has perhaps rarely done, but that would, if we could manage it, really capitalise on our recent good fortune, would be to lift productivity performance while the terms of trade are high. The income results of that would, over time, provide the most secure base for strong increases in living standards. That sort of an environment would be one in which the cautious consumer might feel inclined towards well-based optimism, and reopen the purse strings. ✖

Economic Conditions and Prospects

Glenn Stevens, Governor

Address to the Economic Society of Australia (Queensland) 2011 Business Lunch
Brisbane, 15 June 2011

Thank you for the invitation to visit Brisbane today and to join with the Economic Society here in Queensland to talk about our economic situation.

It is barely five months since the flooding that inundated parts of Brisbane and had such a tragic impact only a couple of hours west of here in Toowoomba and the Lockyer Valley. It is only four months since Cyclone Yasi wrought havoc on some northern coastal communities and flattened key crops. The people of Brisbane, and of Queensland, have shown their resilience and adaptability in the face of these disasters.

The economic effects of those events, and of the Western Australian cyclones over the summer, have been seen at the national level. Falls in coal and iron ore production more than fully explained the decline in measured economic output in the March quarter, which occurred not because demand slumped but because the economy's capacity to supply output was temporarily curtailed. There was also a sharp rise in some prices, which tends to happen when supply is suddenly disrupted. Bananas are the most celebrated manifestation of this. With 75 per cent of the crop more or less destroyed, and few sources of alternative supply available, prices to the consumer have quadrupled.

The effects of these natural disasters are now gradually abating. Information on coal mining suggests that it is gradually recovering, though more slowly than had been expected initially owing to the difficulties of getting water out of the pits. Iron ore production has fully recovered. The banana plants are regenerating. Most other crops are also

getting back to normal supply levels. As this occurs, we should see the impact of these events on prices start to reverse. For Queensland, the scars from last summer's events remain – and always will. The destruction of capital stock is a loss of wealth, but capital can ultimately be rebuilt; lives lost cannot.

But despite the tragedy, Queenslanders are getting on with things.

The broader context in which these events have occurred is well known. The proverbial pet-shop galah can by now recite the facts on Australia's trade with China and our terms of trade, which are at a level not seen in over a century. It was already clear by about 2006 that something quite profound was happening in the continuing rapid growth of China, India and other emerging countries.¹ This upward trajectory continued, and even accelerated in some cases, in the subsequent period. Then the crisis occurred, and the Chinese economy slowed abruptly. But the authorities responded forcefully and China's economy returned to very strong growth quite quickly. And so the trends in place up to the middle of 2008 had resumed within a year.

The rapid growth in Chinese, Indian and other emerging world demand has been stimulating demand in the global economy, despite the weakness in demand from the 'north Atlantic' group of countries. This gives a boost to a country

¹ At that time, my predecessor noted that structural factors such as the industrialisation of China had led to 'the largest cumulative increase in our terms of trade since the early 1970s'. See Macfarlane IJ, 'Opening Statement to the House of Representatives Standing Committee on Economics, Finance and Public Administration', Canberra, 17 February 2006. Available at <<http://www.rba.gov.au/speeches/2006/sp-gov-170206.html>>.

like Australia: our economy's increased exposure to Asia – the part of the world where much of the growth is occurring – plus the high terms of trade make for an expansionary macroeconomic event. At present Australia's terms of trade are about 85 per cent above their 20th century average. The amount of additional income accruing to production in Australia from that is 15 per cent or more of annual GDP. Even allowing for the fact that a substantial fraction of this income accrues to foreign investors that own large stakes in many of Australia's resources companies, this represents a very large boost to national income.

These expansionary forces are at work on an Australian economy that was widely regarded as very fully employed by early 2008, and that experienced only a fairly mild and short downturn thereafter. As of today, measures of capacity utilisation are not as high as at the end of 2007, and unemployment is not as low as it was then. Nonetheless, the degree of slack in the economy overall does not seem large in comparison with the apparent size of the expansion in resources sector income and investment now under way.

With that general outlook, it follows that macroeconomic policies must be configured in the expectation that there will need to be some degree of restraint. Monetary policy has already been exerting some restraint for a while. Looking ahead, our most recent analysis (as published in early May) concluded that the underlying rate of inflation is more likely to rise than fall over the next couple of years. This central expectation – subject to all the usual uncertainties inherent in forecasting – suggests, as we said at the time, that 'further tightening of monetary policy is likely to be required at some point for inflation to remain consistent with the 2–3 per cent medium-term target'. It remains, though, a matter for judgement by the Board as to whether that point has been reached. At its most recent meeting, the Board's view was that it had not been. New information will, as always, be important in our monthly assessments of what monetary

policy needs to do. As far as prices are concerned, we will get another comprehensive round of data in late July.

Fiscal policy is also playing a significant role. The 'fiscal impact', calculated as the shift in the Federal budget position from one year to the next, is forecast to be minus 2 per cent of GDP in the 2011/12 fiscal year. A further, though slightly smaller, effect is forecast by the Treasury in the following year.

There remain, of course, differences in economic performance around the country. Given movements in commodity prices over the past year and the stated investment intentions of major resources companies, these differences are more likely to increase than decrease over the coming period. More generally, while everyone understands that there is a 'mining boom', many people would say that they themselves cannot directly feel the effects. We have seen widespread re-emergence of talk of 'two-speed' or 'multi-speed' economies. Within the state of Queensland itself there were differences in performance, even before the floods, let alone after them.

How then do we make sense of these phenomena?

It is a complex story, and I do not wish to make light of any of the legitimate concerns that people have about the differing economic conditions – actual and potential – across regions or industries. But there are three observations worth making.

The first is that the impact of the resources sector expansion does get spread around, in more ways than might immediately be apparent. Obviously mining employs only a small share of the workforce directly – less than 2 per cent. But to produce a dollar of revenue, companies spend about 40 cents on acquiring non-labour intermediate inputs, primarily from the domestic sector. Apart from the direct physical inputs, there are effects on utilities, transport, business services such as engineering, accounting, legal, exploration and other industries. It is noteworthy that a number of these areas are growing quickly at present.

Once the costs of producing the output and other factors – such as taxes – are taken into account, the remaining revenue is distributed to shareholders or retained. While a significant proportion of the earnings distributed goes offshore, local shareholders also benefit. In fact, most of us are shareholders in the mining industry through our superannuation schemes.² We don't get this income directly to spend now – it is in our superannuation. Nonetheless, it is genuine income and a genuine increase in wealth.

A good proportion of the earnings retained by companies is used to fund a further build-up of physical investment, which imparts demand to construction and manufacturing. Based on the industry liaison the Bank has done, around half – give or take – of the demand generated by these projects is typically filled locally, though, of course, this amount varies with the nature and details of any specific project.

So there are effects that spill over, even though it is not always easy to spot them. In the end the combination of the resources sector strength and all the other factors at work in the economy has, to date, produced a national rate of unemployment of around 5 per cent, and in Queensland only a bit over 5 per cent. There are regional variations in unemployment rates, but at this point these look comparable to what has been seen at most times in the past 10 years – a period that has seen both lower average unemployment rates and lower variation in unemployment rates than the preceding decade.

Secondly, some of the undoubted differences in performance observable at present look like the inverse of earlier differences. Take housing prices and population growth, which are of course quite closely related. It surely is no coincidence that the two state capitals that have had the clearest

evidence of declining house prices over the past couple of years – Brisbane and Perth – are the two that previously had the highest rate of population growth and that have since had the biggest decline in population growth. Moreover, it is hard to avoid the conclusion that changes in relative housing costs between states, while certainly not the only factor at work, have played an important role. Relative costs are affected by interstate population flows, but those costs then in turn have a feed-back effect on population flows. This is particularly so for Queensland.

Historically, Queensland has had faster population growth than the southern states, as it has seen a slightly higher natural increase, a rate of net international migration on par with other states and a very substantial net positive flow of interstate migrants. Net interstate migration to Queensland peaked around 2003 – not long after Sydney dwelling prices had reached a new high relative to other cities. Interstate migration at that time was contributing a full percentage point a year to Queensland's population growth. By 2008 this flow had slowed a bit, but international migration had picked up and Queensland's population growth increased, peaking at nearly 3 per cent. Western Australia's population growth was even higher, peaking at almost 3½ per cent.

Meanwhile, at least up to 2007, people were confident and finance was readily available. Brisbane housing prices, which had been a bit over half of the average level of Sydney and Melbourne prices in 2002, had risen to be almost the same by 2008, which was unusually high.

The rate of interstate migration to Queensland then slowed further, to be at its lowest in at least a decade. The effects of that on state population growth were compounded by a decline in international migration, something seen in all states. At the same time, finance became more difficult to obtain and lenders and borrowers alike became more risk averse. This happened everywhere, but its effects in Queensland seem to have been more pronounced.

² If the allocation of super funds' equity assets to resources companies is broadly similar to that of the Australian share market, then around 10 per cent – or \$130 billion – of Australians' superannuation assets are invested in resources companies. And this 10 per cent has been providing a healthy return; over the past year alone, the average return on resources company stocks has been around 20 per cent.

ECONOMIC CONDITIONS AND PROSPECTS

Since then, Brisbane housing prices have been declining relative to those in the southern capitals and the construction sector here has found it tough going.

So a complex interaction of forces – the commodity price cycle, the financial cycle, population flows, endogenous responses of housing prices that then feed back to population flows and so on – has been occurring. The ebb and flow of these forces has made for differences in performance, first in one direction, then the other.

Thirdly, the industry make-up of our economy is continually changing. While this is often a slow process – almost imperceptible in most years – these shifts have been significant over time. There is little doubt that trade-exposed manufacturing firms not linked to the resources sector are facing tough conditions at present. But many people might be surprised to learn that the peak in manufacturing's share of Australia's GDP was in the late 1950s – more than five decades ago. Its fastest rate of relative decline, so far, was probably in the second half of the 1970s. On the other hand 'business services' – including things such as accountancy, legal and numerous other services – have grown fairly steadily and now are credited with more than twice the share of GDP of manufacturing.³ Several of these sectors are being boosted by the flow-on effects of the resources boom at present.

As for the mining sector itself, its share of GDP has tended to rise since the late 1960s, having been quite low in the mid 20th century. But in 2010, the mining sector's share of GDP was still only about the same as it was in 1910. It will surely increase noticeably over the next five years, though will remain much smaller than it was in the gold rush era.

³ We define 'business services' as those where the end user is more often a business than a household. The category encompasses the following sectors: Information, Media and Telecommunications; Financial and Insurance Services; Rental, Hiring and Real Estate Services; Professional, Scientific and Technical Services; and Administrative and Support Services.

Again, none of this is to deny that there are differences in performance by industry and region. It is simply to give some perspective on what we see.

The point about long-term shifts reminds us to look beyond the immediate conjuncture, and to think about the magnitude of the event through which we are living. For a good part of the change in our terms of trade is a manifestation of a large and persistent *change in global relative prices*. Let me be clear here: there *is* a cyclical dimension to the China story, and it is important that we remember that. But there is *also* a *structural* dimension. And the associated change in relative prices constitutes a force for significant structural change in the economy. I think we have all only begun to grasp its implications relatively recently.

For a long time, the world price of foodstuffs and raw materials tended to decline relative to the prices of manufactures, services and assets. But for some years now the prices of things that are grown, dug up or otherwise extracted have been rising relative to those other prices. This is mainly due to trends in global demand. At any point in time for a particular product we can appeal to supply-side issues – a drought, a flood or a mine or well closure, or some geo-political event that is seen as pushing up prices. But stepping back, the main supply problem is really that there has simply been more demand than suppliers were prepared or able to meet at the old prices.

We do not have to look far for the cause: hundreds of millions of people in the emerging world have seen growth in their incomes and associated changes in their living standards, and they want to live much more like we have been living for decades. This means they are moving towards a more energy- and steel-intensive way of life and a more protein-rich diet. That fact is fundamentally changing the shape of the world economy. Even if China's growth rate moderates this year, as it seems to be doing, these structural forces almost certainly will continue.

It is worth noting in this connection that many commentators have for years been calling on policymakers in the emerging world to adopt growth strategies that rely more on domestic demand and less on exports to major countries. This is happening. It carries the implication though that, first, more of the marginal global spending dollar is going to products that are steel-, energy- and protein-intensive for the emerging world's consumers and less on other things like, say, luxury property in western countries.

Secondly, more of the marginal production of the world economy has to be in those raw material-intensive products – and in the raw materials themselves – and less in the production of the other things. Ultimately there will be enough steel, energy, food and so on to meet demand – supply is responding. But considerable adjustment is needed to get there (and Australia is a very prominent part of that adjustment).

The average consumer in an advanced economy is effectively experiencing a decline in purchasing power over food, energy, and raw material-intensive manufactures. Australian consumers face this to some extent as well. Were Australia not a producer of raw materials, we would be experiencing a good deal more of it. In such a world, there would be no resources sector build up. Our currency would be much lower. We would be paying much more for petrol at the pump, for our daily coffee and for a wide range of other consumer products. We would not be holidaying overseas in our current numbers.

We would have more of some other forms of economic activity that we currently have less of – we would, perhaps, be less of a 'multi-speed' economy. But it's unlikely our economy overall would be stronger. As it is, the rate of unemployment has seldom, in the past few decades, been much lower than it has been recently. Moreover, in that alternative world the real income of Australians in aggregate would be a good deal smaller.

But Australia *is* a resource producer, so we have the advantage of being able to take part in the additional supply of things that are in strong demand. This helps our incomes. Mining companies are doing their best to capitalise on the increase in demand, and the effects of this will flow through the economy, but other producers are also enjoying a boost to their income. Rises in the global prices of rural commodities over the past couple of years have been sufficient to deliver higher prices to most farmers despite the appreciation of the Australian dollar.

As consumers, the rise in our currency means that we take some of that higher income in the form of greater command over tradeable goods and services. The foreign exchange market being what it is – namely an asset market – it has looked a long way forward into the resources boom and pushed up the currency quite quickly. This is having significant effects. While consumers do seem to be continuing their more cautious mindset overall, many seem over the past year to have had the confidence to leave the country to experience foreign travel at prices more attractive than any seen for a long time. Australia's tourism sector is feeling the resultant loss of business, particularly in Queensland where the floods also had a separate impact on confidence. That latter effect will pass – Queensland's set of natural endowments that attract tourists remains in place. But the need to adapt to the high exchange rate may continue.

For as well as conveying a rise in purchasing power to consumers, the high exchange rate is exerting a powerful force for structural change. I think we are seeing this in the retail sector. The rapid growth of internet commerce – from a very small base – has been the topic of considerable discussion. This was bound to happen anyway with technology. But with the higher Australian dollar, the component of the retail 'product' that is added in Australia – the local distribution and retailing overheads that are required to provide the retail 'experience' – has become both much more visible, and much higher *relative* to the

production cost of the good itself. So the incentive for the consumer to avoid those overhead costs has increased quite noticeably. The retail sector is therefore under pressure to reduce those costs.

These are just some of the structural adjustment forces at work. Of course it is easy to talk about structural change in the abstract. It is another thing to cope with it in practice. There are no magic-pill solutions, nor are there any real alternatives to adjustment. What solutions there are, though, are likely to involve a refocusing on productivity performance after a period in which, at least at a national level, our productivity growth has been disappointing.

Yet, as I have said before, this is a much better problem to have than those we see in many advanced countries. The event to which we have to adjust is inherently income-increasing for Australia. Moreover, we do not carry the legacies of the past several years in our banks' or public-sector balance sheets that are such an impediment in other places.

Conclusion

Queenslanders have shown their resilience and adaptability this year in the face of extraordinary events. People from elsewhere in Australia have nothing but admiration for you.

Resilience and adaptability are among the characteristics we will all need in order to cope with a global environment that is growing more complex rather than less, and that presents both economic challenges and opportunities greater than those we have seen for many years.

The task for the economics profession – all of us here today and in like gatherings and institutions around the country – is to do our part in trying to understand these challenges and opportunities, to explain them to our communities, and to articulate the responses that are most likely to see our country prosper. ✦

The RBA's Thinking on the Economy over the Past Year

Ric Battellino, Deputy Governor

Address to *The Economist's* Bellwether Series: Australia
Sydney, 23 August 2011

Over the past year, the Australian economy has been subject to a number of strong, often countervailing, economic forces: strong demand for commodities, rising global inflation, global financial market instability, consumer caution, slower population growth and slow productivity growth. The economy has also been affected by severe weather events. Today I would like to look back over the year and review how these forces have shaped the economy and the Reserve Bank's thinking on monetary policy.

If we start by casting our minds back a year ago, you will recall that the Bank at that time was starting to contemplate whether it should move from a relatively neutral setting of monetary policy to one that was slightly restrictive. The global economy was growing at a solid pace, though with clear downside risks. Domestically, a rebalancing in demand, from public to private spending, was starting to take place; the outlook for business investment was particularly strong. Employment was growing very quickly, unemployment had fallen back to just above 5 per cent, and inflation was forecast to reach the top end of the target range over the subsequent couple of years.

The Board's assessment of these circumstances was that, if they continued and the economic outlook evolved as expected, there would be a case to raise interest rates a little at some point. However, the uncertainty in global markets, due to the spread of sovereign debt concerns beyond Greece, was seen as posing downside risks to the global economy, and

consequently to Australia. Also, the strong exchange rate and weak demand for credit pointed to financial conditions perhaps being somewhat tighter than might be indicated simply by reference to interest rates. These considerations were seen as reasons for caution and, in the event, the Board held interest rates steady through to November 2010.

By the November meeting, financial market volatility had declined and the Chinese economy was continuing to grow strongly. Earlier downside risks to global growth had diminished somewhat and it was becoming clear that global GDP would record a very strong increase for 2010 as a whole. Domestically, employment had continued to grow very quickly. While there were significant differences in the performance of various sectors of the economy, overall it appeared that resource utilisation in the economy was tightening. The CPI outcome for the September quarter had been a little lower than expected, but the assessment remained that the downward trend in inflation had largely run its course. The forecasts envisaged a strengthening economy, with the effects of the rising terms of trade more than offsetting those from fiscal tightening. Also, inflation was testing the top of the target range by the end of the forecast period. The Board therefore concluded that the balance of risks had shifted to the point where a move to a slightly restrictive stance of monetary policy was prudent, and it decided to lift the cash rate by 25 basis points to 4.75 per cent.

Banks responded to the November increase in the cash rate with substantially larger increases – around 40 basis points – in interest rates on housing loans. The size of this increase, and the controversy it created, seemed to have a noticeable impact on household behaviour. Consumer confidence fell, though to levels that were still above average. Coincidentally, there was a renewed step up in financial market volatility, stemming from the widening government debt problems in Europe; this probably also contributed to households becoming less confident.

At the same time, however, the prices of commodities important to Australia – i.e. coal and iron ore – continued to strengthen and prospects for the terms of trade were revised up further. The outlook for investment in the resources sector remained very strong.

The Board concluded at its December 2010 meeting that, having moved in a forward-looking way in November, there was scope to hold rates steady for a while to see how conditions in Australia developed and how the various risks to the economy evolved.

As we moved into the early months of 2011, domestic economic activity was severely disrupted by floods and cyclones. The two main economic impacts were the sharp fall in coal production, and the destruction of the Queensland banana crop. The former meant that GDP was likely to fall in the March quarter, before recovering in the June and September quarters, while the latter meant that CPI inflation would spike higher over the year ahead due to a sharp, yet temporary, increase in banana prices.

Neither of these factors, by itself, was seen by the Board as having direct implications for monetary policy, although it was recognised that they would make reading the underlying economic trends more difficult over the months ahead.

Global economic data generally continued to be strong in the early months of 2011, particularly in Asia but also in the United States and Germany. Commodity prices continued to rise, and there were

increasing signs that this was feeding, via rising cost pressures, into inflation outcomes in a wide range of countries. As a result, there was a general trend towards tightening monetary policy through Asia and Latin America.

Domestically, the effects of the floods were becoming clearer in the data, and liaison with mining companies was starting to point to a more protracted recovery in production. Economic indicators were mixed: business conditions were around average, the outlook for investment was strong, unemployment was holding steady at a low level but retail sales had been growing only modestly. Financial market uncertainty had lessened following further measures taken by European governments, though social unrest in the Middle East and North Africa was keeping markets on edge. Against this background, the Board saw little need to change the level of interest rates at its February, March and April meetings.

In May, the Board again held the cash rate steady. However, the CPI outcome for the March quarter was higher than expected and inflation forecasts were scaled up somewhat. Global economic growth was expected to continue at an above-trend pace, notwithstanding the disruption to global supply chains caused by the Japanese earthquake in March; commodity prices were higher than earlier expected; and global inflationary pressures had risen. Therefore, while the Board saw the existing mildly restrictive stance of monetary policy as appropriate for the time being, its assessment was that if conditions evolved in line with the outlook, another rise in interest rates would likely be required, at some point, if inflation was to remain consistent with the medium-term target.

By the June meeting, signs were emerging that economic growth in many developed economies had lost some momentum. Increased financial volatility, as the debt problems within Europe spread, added to the downside risks. Growth in China and most other parts of Asia, however, remained a bright spot.

The March quarter national accounts suggested that the impact of the floods on Queensland coal production had been significantly larger than expected and the timing of the recovery in production was pushed out further. While the outlook for mining investment was very strong, non-mining investment was looking softer and households were showing more signs of caution, with confidence declining; households' perceptions of their own personal finances over the coming year were particularly weak. It was also more apparent that employment growth had slowed, though this appeared to be taking place against a background of slowing population growth, and unemployment was holding steady at a relatively low rate of around 5 per cent.

While the Board remained of the view that, if conditions evolved in line with the forecasts, further tightening of monetary policy would be necessary at some point, the recent flow of data had not added any urgency to the need to adjust policy. Accordingly, the cash rate continued to be held steady.

At the time of the July meeting, global economic growth had eased, and the downside risks stemming from the European debt problems looked more significant. In Australia, households remained cautious and the housing market was soft. Also, it now appeared that the slow recovery in coal production would mean that earlier GDP forecasts for 2011 would not be met. Nonetheless, the medium-term outlook for the Australian economy remained strong. In these circumstances, the Board continued to hold rates steady, noting that the CPI outcome to be published in the next month would provide an update on inflation.

The state of the global and domestic economies had not changed much by the time of the August meeting, but the CPI outcome for the June quarter again surprised on the upside. Price increases for a range of manufactured goods were larger than expected in light of the appreciation of the exchange rate and the ongoing caution among consumers. There was the possibility that the slower

growth in productivity that had been evident for some years was pushing up unit labour costs at a pace faster than was consistent with the inflation target. At the August meeting the Board therefore discussed whether there was a case to tighten monetary policy further. The general case to do so was that the economy was continuing to operate with relatively little spare capacity, and the staff forecasts showed inflation rising above target during the forecast period. On the other hand, activity in parts of the non-mining economy was subdued and downside risks to the global economy had increased significantly due to the volatility in financial markets. Also, the softness in credit demand and the high exchange rate pointed to financial conditions exerting a reasonable degree of restraint. These considerations led the Board to conclude that it would be prudent to continue to hold rates steady.

Summarising all this, the general pattern that has emerged over the past year has been as follows:

- First, the effects of the mining boom have turned out to be stronger than expected a year ago. The terms of trade are noticeably higher and forecasts for national income and mining investment have been revised up over the year.
- Second, despite this strength in the mining sector, overall economic growth is turning out to be weaker. The forecasts published earlier this month reduced growth in GDP for 2011 to 3¼ per cent, versus 3¾ per cent expected last November. Part of this downward revision reflected the higher exchange rate as well as a softening in some components of demand, stemming partly from consumer caution. However, some of the revision also reflected a slowing in the economy's capacity to supply goods and services, due to weather events and slower growth in the labour force. In recent quarters, growth of the working age population has been running at an annualised rate of only a little more than 1 per cent, down from a peak of around 2¼ per cent a few years ago. In these circumstances, while employment growth has

slowed noticeably, there has been little change in the unemployment rate.

- Third, inflation outcomes for 2011 are likely to turn out to be higher than thought last November, both in headline and underlying terms. Inflation forecasts for the longer term have risen to be a little above the top end of the target range.

This was the situation as it stood at the time of the last Board meeting. As you know, since then market volatility has become more extreme. An important issue ahead of us will be to assess what impact this is likely to have on global and domestic economic activity, commodity prices and inflation. As yet, there is little information on which to base such judgements.

Conclusion

Let me conclude.

The main reason for running through this material has been to make the point that the environment for monetary policy over the past year has been challenging. As the year has progressed, the resources boom has strengthened, but the divergence between the mining and non-mining sectors of the economy has increased and the mix of growth and inflation has turned out to be less favourable than expected a year ago – i.e. there has been less growth but more inflation.

Decisions about monetary policy through the year have sought to balance these various forces. This challenge remains. In fact, with the recent volatility in financial markets adding to the uncertainty about the economic outlook, it does not look like the challenge will become any easier over the months ahead. ✖

Reserve Bank Publications

Most of the publications listed below are available free of charge on the Bank's website (www.rba.gov.au). Printed copies of these publications, as well as a wide range of earlier publications, are also available on request; for details refer to the enquiries information at the front of the *Bulletin*.

Statement on Monetary Policy

These statements, issued in February, May, August and November, assess current economic conditions and the prospects for inflation and output.

Financial Stability Review

These reviews, issued in March and September, assess the current condition of the financial system and potential risks to financial stability, and survey policy developments designed to improve financial stability.

Annual Reports

- *Reserve Bank of Australia Annual Report*
- *Payments System Board Annual Report*
- *Equity & Diversity Annual Report*

Research Discussion Papers (RDPs)

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The abstracts of most RDPs and the full text of RDPs published since 1991 are available on the Bank's website.

Conference Volumes

Conference volumes have been published since 1993. The most recent titles are:

- *Reserve Bank of Australia 50th Anniversary Symposium*, July 2010
- *Inflation in an Era of Relative Price Shocks*, May 2010

- *Lessons from the Financial Turmoil of 2007 and 2008*, October 2008
- *The Structure and Resilience of the Financial System*, November 2007
- *Demography and Financial Markets*, October 2006
- *The Changing Nature of the Business Cycle*, October 2005
- *The Future of Inflation Targeting*, November 2004
- *Asset Prices and Monetary Policy*, November 2003

Other Publications

The Bank periodically produces other publications that may take the form of submissions to inquiries, surveys or consultation documents. Some recent examples include:

- *Review of Card Surcharging: A Consultation Document*, June 2011
- *Strategic Review of Innovation in the Payments System: Issues for Consultation*, June 2011
- *Strategic Review of Innovation in the Payments System: Results of the Reserve Bank of Australia's 2010 Consumer Payments Use Study*, June 2011
- *Central Clearing of OTC Derivatives in Australia*, June 2011
- *Submission to the Inquiry into Access for Small and Medium Business to Finance*, February 2011
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- Still Interesting Times, Glenn Stevens, Governor, September 2011
- The RBA’s Thinking on the Economy over the Past Year, Ric Battellino, Deputy Governor, August 2011
- Strategic Review of Innovation in the Payments System, Christopher Kent, Head of Payments Policy Department, July 2011
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