

# Bulletin

JUNE 2017



RESERVE BANK  
OF AUSTRALIA

### Contents

#### Article

Houses and Apartments in Australia	1
Estimating the NAIRU and the Unemployment Gap	13
Australian Capital Flows	23
Banking Fees in Australia	35
How Have Australian Banks Responded to Tighter Capital and Liquidity Requirements?	41
The Australian Exchange-traded Funds Market	51
The Ongoing Decline of the Cheque System	57
Conditions in China's Listed Corporate Sector	67
The Chinese Interbank Repo Market	75

#### Appendix

Reserve Bank Publications	87
Copyright and Disclaimer Notices	89

The *Bulletin* is published under the direction of the Publications Committee: Luci Ellis (Chair), Andrea Brischetto, Ellis Connolly, Lynne Cockerell, Katie Fitzpatrick, Darren Flood and Paula Drew (Secretary).

The *Bulletin* is published quarterly in March, June, September and December and is available at [www.rba.gov.au](http://www.rba.gov.au). The next *Bulletin* is due for release on 21 September 2017.

For printed copies, the subscription of A\$25.00 per annum covers four quarterly issues each year and includes Goods and Services Tax and postage in Australia. Airmail and surface postage rates for overseas subscriptions are available on request. Subscriptions should be sent to the address below, with cheques made payable to Reserve Bank of Australia. Single copies are available at A\$6.50 per copy if purchased in Australia.

Copies can be purchased by completing the publications order form on the Bank's website or by writing to:

Secretary's Department  
Reserve Bank of Australia  
GPO Box 3947  
Sydney NSW 2001

*Bulletin* enquiries  
Media and Communications  
Tel: +61 2 9551 8111  
Facsimile: +61 2 9551 8033  
Email: [rbainfo@rba.gov.au](mailto:rbainfo@rba.gov.au)

The graphs in this publication were generated using Mathematica.

The contents of this publication shall not be reproduced, sold or distributed without the prior consent of the Reserve Bank and, where applicable, the prior consent of the external source concerned. Requests for consent should be sent to the Secretary of the Bank at the address shown above.

ISSN 0725–0320 (Print)  
ISSN 1837–7211 (Online)

Print Post Approved  
PP 243459 / 00046

# Houses and Apartments in Australia

Tom Rosewall and Michael Shoory\*

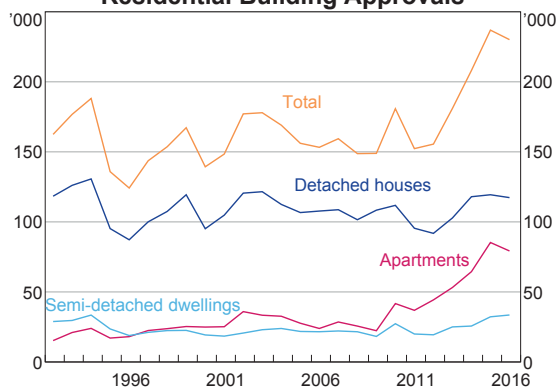
Apartments have become an important part of the housing mix in Australia. This has several implications for assessments of residential activity. The lag from a change in monetary policy to the effect on residential activity might increase, because it takes longer to build large apartment buildings than detached houses. Apartment developments use different construction materials and labour, and may face different cost pressures to the detached house segment. They also face different supply-side constraints.

## Introduction

The composition of homes being built in Australia has changed substantially over the past decade. The number of apartments constructed each year has tripled since 2009 and, last year, apartments accounted for around one-third of residential building approvals (Graph 1). In contrast, the volume of detached houses built last year was roughly in line with the average over the past three decades. The shift towards higher density housing is bringing Australia more into line with international norms because Australia's existing housing stock is heavily concentrated in detached houses and its cities have a relatively low density compared with those in other industrialised economies (RBA 2014a). The increase in apartment construction has driven new housing construction to a historically high level and made a strong contribution to economic growth (Graph 2).

Differences between the construction processes for apartments and detached houses are important to consider in the analysis of the housing sector and related macroeconomic variables. This includes the pipeline of dwelling

**Graph 1**  
**Residential Building Approvals**

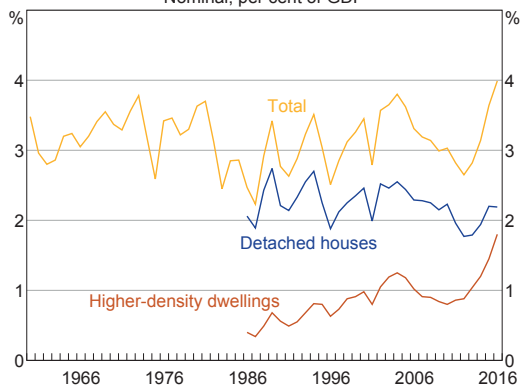


Sources: ABS; RBA

investment, the measurement of housing turnover and price inflation. Although residential construction accounts for a relatively small share of economic activity, it has a large effect on overall developments in the Australian economy. This is because new dwelling investment is volatile and it has strong links with spending on household goods. In addition, dwelling investment is relatively sensitive to changes in interest rates compared with other parts of the economy. As such, the longer development timelines for apartment projects have implications for the lags between changes in interest rates and activity.

\* The authors are from Economic Analysis Department.

**Graph 2**  
**New Dwelling Investment\***  
Nominal, per cent of GDP



\* Private sector; excludes alterations and additions  
Sources: ABS; RBA

The relative importance of supply-side issues, such as land availability and planning processes, also differs between houses and apartments. In addition, the two types of dwellings use different materials and supply chains which have implications for our assessment of cost pressures and final prices (which ultimately feed through to the consumer price index (CPI)).

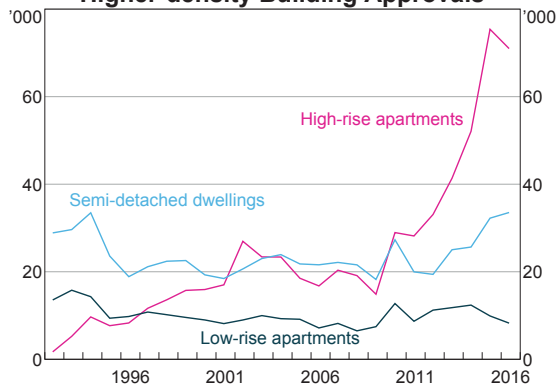
### Dwelling Types and Recent Activity

Dwellings approved for construction in Australia can be broken down into two broad categories (as defined by the Australian Bureau of Statistics (ABS)): detached houses, which accounted for about three-quarters of the dwelling stock in the 2011 Census; and higher-density dwellings. The latter can be further split into apartments (defined as ‘flats, units or apartments’), which accounted for about 15 per cent of the stock of dwellings in 2011, and ‘semi-detached’ dwellings (such as townhouses, terraces and semi-detached houses), which accounted for 10 per cent.<sup>1</sup> ‘High-rise’ apartments have

1 This level of disaggregation of building type is not available for most other indicators of residential activity, including other ABS data releases (such as building work done), and housing price indicators compiled by the ABS and other sources.

accounted for much of the increase in residential building approvals since the start of the decade (‘high-rise’ is defined as projects that are four storeys or greater; Graph 3).<sup>2</sup> Approvals for detached houses have increased from their trough in 2012 to be around their average of the past three decades.

**Graph 3**  
**Higher-density Building Approvals**

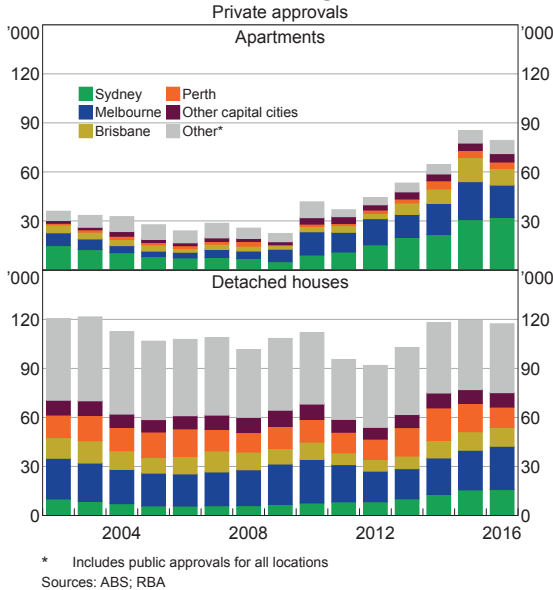


Sources: ABS; RBA

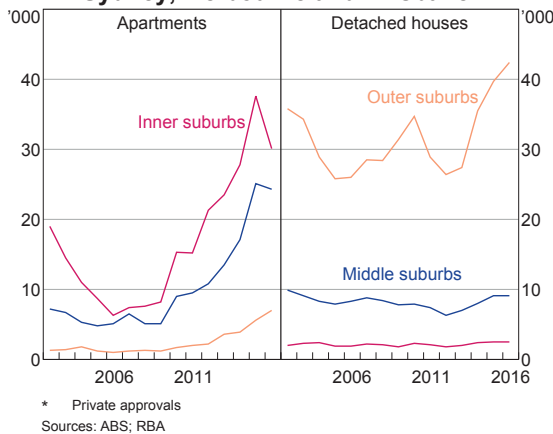
Building approvals for apartments have been highly concentrated in large cities – the capital cities accounted for 90 per cent of apartment approvals in 2016, of which most were in Sydney, Melbourne and Brisbane (Graph 4). By comparison, approvals for detached houses have been more geographically dispersed, with around two-thirds of approvals last year located in the capitals, and less than half in the eastern seaboard capitals. In the major cities, apartments have been mostly constructed in inner (and, to a lesser extent, middle) suburbs, which are well connected with employment centres and amenities, though the concentration has varied somewhat by city (Graph 5). In contrast, new house construction has largely been located in fringe or outer suburbs of cities where land is more readily available.

2 The ABS building approvals data for apartments in buildings that are four storeys or greater are unable to be disaggregated any further.

**Graph 4**  
**Residential Building Approvals**



**Graph 5**  
**Residential Building Approvals in Sydney, Melbourne and Brisbane\***

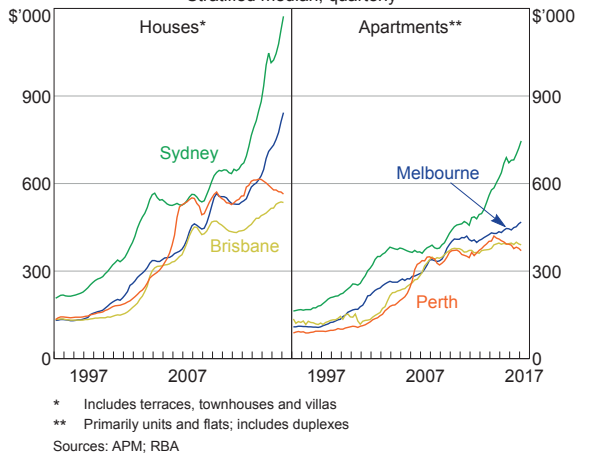


## Dwelling Demand and Buyers

Determinants of demand for different types of dwellings include affordability, location and buyer types and preferences, alongside macroeconomic determinants such as population and employment growth. Apartments are typically much more affordable than houses. The median price of apartments is around 30 per cent lower than

that for houses, in part because apartments are typically smaller but also because apartments use land more intensively (Graph 6). In recent years, lower relative prices have supported the demand for apartments as land supply constraints in the eastern cities have led to significant land price inflation (the supply of land for detached houses is ultimately more limited relative to that for higher-density dwellings), most notably in Sydney.

**Graph 6**  
**Dwelling Prices**  
Stratified median, quarterly



Location and lifestyle preferences also influence buyers' decisions. New apartments are generally located in established suburbs close to employment and services, while new houses are often built in greenfield areas that may be awaiting infrastructure and other amenities. The desire to reside close to major employment centres and transport links is likely to have increased in larger cities where travel times have lengthened. Demographic factors and household formation also matter – larger households are more likely to want larger dwellings, such as houses, while smaller households, such as single adults and older 'downsizers', may prefer apartments.

There are three broad types of buyers for new dwellings – owner-occupiers, domestic investors and foreign buyers (i.e. non-residents). The

prominence of these buyer types differs for houses and apartments, and can also vary by location (particularly for apartments) (Shoory 2016).

Information from the Bank’s liaison program suggests that, in recent years, domestic investors and foreign buyers have generally been much more prominent in purchasing new apartments than they have been for new houses.<sup>3</sup> Demand from these buyers has partly driven the shift towards apartment construction, and is likely to have led to an increase in the net supply in rental apartments. Rental yields for apartments are higher than those for houses (Graph 7). Foreign buyers are also likely to be more familiar with apartment-style living, given many international cities have a high share of apartments, and are likely to prefer locations in more convenient inner-city areas or near existing communities. In contrast, owner-occupiers reportedly account for the majority of new detached home purchases, partly reflecting demographic factors and household size. The net effect of these purchases

on the housing supply will depend on the location and size of the existing property the purchaser is moving from and whether there is a change in the rate of household formation.

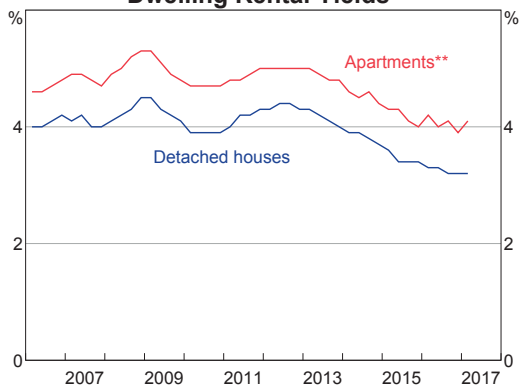
## Development and Construction

Development and construction timelines for both detached houses and apartments are long and variable, and the time taken at each stage can vary greatly. These differences are important to consider when assessing market conditions, including changes in supply and demand, and the response to changes in interest rates.

Even before construction commences, the time spent developing apartment projects is often lengthy. Once a developer has purchased a site, it may take several years until construction commences (Table 1). Securing a development approval (DA) may take several months or years, particularly if planning issues are encountered. Evidence from the Bank’s liaison program suggests that most apartment projects require the majority of apartments to be pre-sold off the plan for the developer to secure finance. Marketing to prospective buyers may take months or even longer than a year, depending on the characteristics of the project. Builders are typically secured by developers via a tender process, and only once all these arrangements are in place will building permits be obtained. This is the stage at which the ABS typically records a building approval. Given that most of the development time occurs before a building approval is recorded, building approvals data do not provide a read on how the earlier stages of the development pipeline may be evolving.

Developing land and building detached houses are often separate processes. Greenfield land estates are often developed by specialists who then sell to individuals (who source their own builder) or to builders (who sell house and land

**Graph 7  
Dwelling Rental Yields\***



\* Based on a hedonically adjusted index

\*\* Flats, units, apartments, townhouses and villas

Source: CoreLogic RP Data

3 Foreign individuals and temporary residents are permitted to purchase any new dwelling. Temporary residents with visas that allow them to stay in Australia for a continuous period of more than 12 months (such as some foreign students and people on skilled business visas) are permitted to purchase one established home provided it is used as their principal place of residence while in Australia and is sold once vacated.

**Table 1: Apartment Projects**

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Site selection, design project and prepare development application	Authority assesses development application for approval (may involve community input, appeals, amendments and zoning changes)	Market apartments. Secure pre-sales, builder and project finance	Receive permit to proceed with construction (building approval generally recorded by ABS)	Construction (dwelling investment recorded by the ABS)	Settlement (owners or tenants can occupy apartments)

Source: RBA business liaison

packages to households).<sup>4</sup> The timelines for developing housing on greenfield land can vary significantly, particularly if rezoning is required (Table 2). Once land has been developed and registered to an owner, construction of a house may commence quickly. For detached houses in established/existing suburbs, referred to as 'infill housing', the overall planning process is typically shorter than in greenfield areas (though it may be extended if characteristics of the build are unusual relative to the local area).

It generally takes longer to construct apartment buildings than detached houses due to their larger scale. Liaison with industry contacts suggests that construction of a large high-rise project takes 2–3 years, though this can increase to 4–5 years for very large towers, compared

to 6–9 months for most detached houses.<sup>5</sup> Additions to the housing supply from apartment construction are also lumpier, with the largest projects comprising more than 1 000 dwellings.

### Implications of development timelines

The longer and lumpier apartment project construction timelines have a range of implications for forecasting dwelling investment activity, and also understanding the contribution of dwelling investment to economic activity. In the current cycle, the shift in housing composition towards apartments, and more specifically towards high-rise apartments, has led to an increase in the average construction time for dwellings. Historically, dwelling investment in Australia has been very responsive to changes in monetary policy. Although it is difficult to formally test the

**Table 2: Greenfield Housing Projects**

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
	Land development			House construction	
Site selection and rezoning to residential (if required)	Development plan and approval (includes plans for roads, utilities and community services)	Sub-divide land and commence civil infrastructure works. Marketing and sales of individual lots may commence	Issue titles for individual lots/ registered owners (once development completed)	Owner of titled land appoints builder, acquires development approval and construction commences	Settlement of house purchase (or sale of completed house if the developer was also the builder)

Source: RBA business liaison

4 Some land developers are also builders. A limited volume of speculative house and land development also takes place, where a builder will construct a house and then sell it on the market.

5 ABS (2016) suggests that in recent years the average completion time is around 6 quarters for apartments (covering projects of all sizes) and 2 quarters for detached houses.



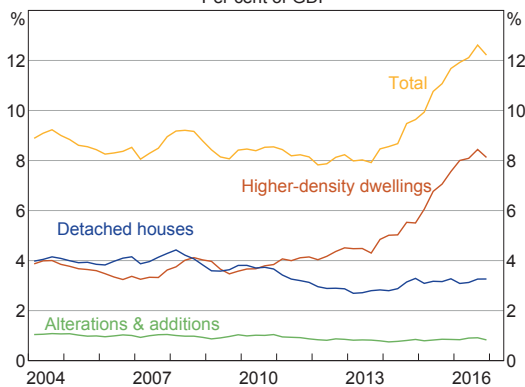
relationship between interest rates and apartment activity with only a partly completed cycle, it is likely that the new apartment activity stemming from a change in interest rates will, on average, flow through to the economy over a much longer time period than for detached houses.

The increased length of construction in turn affects the interpretation of the pipeline as a leading indicator of dwelling investment (Graph 8). An approved apartment typically takes at least three times as long to complete as a detached house, which means that the pipeline of work to be done provides information on dwelling investment further into the future. The shift in composition of approvals towards apartments, if sustained, would result in a larger pipeline of work to be done. The longer lag between the decision to build an apartment and its completion means that the impact of changes in the supply of housing on other housing market indicators, including prices, rents and vacancy rates, may be less predictable than in the past (RBA 2017).

There are also other considerations as the length of time between the decision to build (for developers) or buy (for individuals) changes. For example, changes in financing conditions will take longer to flow through to construction activity. Furthermore, there is more time during which conditions in the underlying economy or personal circumstances can change between the off-the-plan sale of an apartment and its completion. As such, the full impact of changes in policies that affect demand and supply may not be fully realised by the dwelling sector for several years.<sup>6</sup>

Housing turnover appears to have been unusually weak in recent years compared with

**Graph 8**  
**Residential Construction Pipeline\***  
Per cent of GDP



\* Dwelling units under construction or approved but not yet commenced  
Sources: ABS; RBA

the strength in a range of other housing market indicators. It is likely that part of the recent weakness in the measured housing turnover rate could be due to measurement issues arising from the increased share of apartments in new housing construction (Leal *et al*, 2017). As the majority of new apartments are purchased off the plan, well before construction has commenced, sales can have settlement lags of around two or three years, or longer. However, data providers have limited information about these sales until settlement, implying that contract-dated measures of housing turnover are likely to be understating actual turnover in recent years. Elevated levels of new apartment construction would be expected to increase the degree of this understatement.

### Supply-side Issues

There are several factors that have affected how the supply of new housing has responded to price movements over recent years.<sup>7</sup> These include the acquisition and development of land on which construction will take place, providing infrastructure to service that land (if necessary),

<sup>6</sup> For example, buyers of off-the-plan apartments may seek a pre-approval for a loan. The long lag to the completion of construction increases the risk that the lender may decide to reduce the amount they are willing to lend at final approval, thereby increasing the risk that the buyer is no longer able to complete the transaction.

<sup>7</sup> See Hsieh, Norman and Orsmond (2012) for a detailed description of supply factors in the housing sector.

and the planning and approvals process (including land-use zoning, the DA and building permits).

The extent to which supply-side factors influence the responsiveness of construction of new dwellings differs for houses and apartments. Land developers and home builders in the Bank's liaison program generally report that the greatest impediment to the supply of new houses is the availability of land that is serviced with necessary infrastructure. This reflects a combination of geographic constraints (which limit the raw quantity of land available for development), fragmented ownership of the land that has been identified for potential development, and the provision and financing of infrastructure to service that land (including water and sewerage systems, public transport and roads). The latter is particularly relevant for the construction of new houses because these dwellings are usually located in new suburbs (i.e. greenfield areas).

The planning and approval process is generally cited as a significant impediment to new apartment construction by developers in the Bank's liaison program. This includes the zoning restrictions attached to land in established suburbs, such as density and height restrictions and permissible uses of that land, and the time and complexity associated with obtaining a DA. The availability of suitable land ('sites') is also a factor for new apartment projects, though geographic limitations and infrastructure provision are generally less binding constraints. This is because these dwellings use land more intensively than houses, achieving much greater density. In addition, those sites are most commonly located in established suburbs that are already connected with necessary infrastructure (though upgrading infrastructure and amenities to cope

with increased population density is a necessary consideration for the relevant authorities).<sup>8</sup>

The impact of these supply issues also varies by location. For instance, land supply constraints for houses have been particularly acute in Sydney in recent years; geographic constraints and strong demand for land have contributed to substantial price increases and lengthy development lags. For apartments, the time and complexity of the DA approval process reportedly differs both across and within cities, and influences the number and scale of apartment projects, and the speed with which supply responds to demand. The Bank's liaison with industry participants suggests that a more centralised framework (such as when the state government planning department assesses the DA) generally facilitates a quicker response compared with situations where local councils make the decision (Shoory 2016).

## Input Costs and Dwelling Prices

There are differences in the labour and material inputs used in the construction of houses compared with apartments. These differences and the composition of the new dwellings being constructed have potentially important implications for assessing cost and price inflation in the economy.

The Bank's liaison with industry participants suggests that labour and materials each account for around half the cost of construction for both apartments and houses. Nevertheless, there are some differences in the types of labour and materials used. For instance, apartment construction typically involves a higher proportion of steel, concrete and glass relative to detached houses, while the latter requires a larger share of timber and bricks. High-rise structures also require

<sup>8</sup> More recently, a tightening in the availability of finance has been cited as another significant impediment to developing apartment projects, particularly in markets where banks are concerned about the potential for oversupply.

more complex components than detached houses, such as elevators and reinforced windows. Site access is often more difficult and costly for apartment projects.

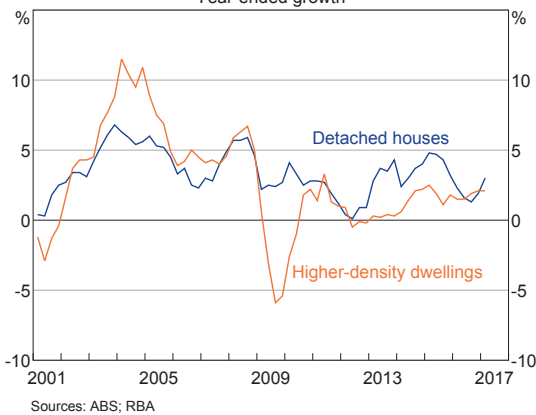
The labour requirements also differ, including in the trades and professions required for construction, and the organisation of the labour (particularly in the larger cities). Bricklayers, for example, are commonly required in building houses but not for high-rise apartment projects.<sup>9</sup> A very large share of labour costs for detached houses is accounted for by subcontractors who are often sole traders. By contrast, labour for high-rise apartment and office construction sites, at least in the eastern states, tends to be attached to large companies with significant workforces.

Trends in construction costs over time have differed (sometimes considerably) for houses and apartments, in part due to differences in the construction supply chain. For much of the past five years, the cost of building detached houses has grown more quickly than the cost of higher-density dwellings (including apartments) (Graph 9). The slower growth in apartment building costs could reflect a range of factors

including larger productivity improvements and spare capacity in the construction of office property, which uses similar materials and labour inputs to apartments. Earlier in the 2000s, apartment construction costs were more volatile than detached costs.

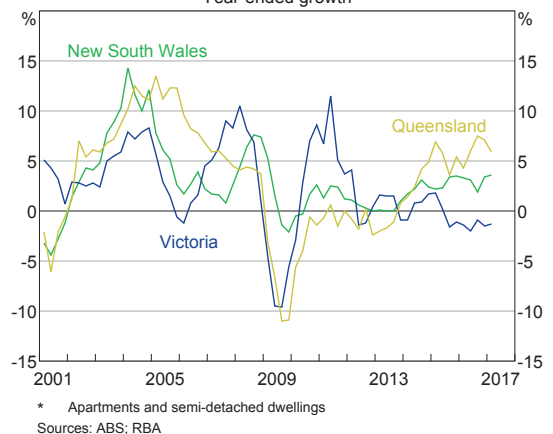
These cost and price dynamics are particularly relevant for consumer price inflation, given the large weight (9 per cent) for 'new dwelling costs' in the CPI. New dwelling costs were measured as the cost of construction for a new detached house until December quarter 2016, but from the March quarter 2017, the CPI also included costs for apartments in the new dwelling cost series (ABS 2017a). This change in measurement is an important consideration, given the historical differences in cost growth for these dwelling types and the increased share of new dwellings accounted for by apartments in recent years (apartments account for about one-fifth of new dwelling costs). There can also be substantial differences in the rate of apartment cost inflation by city (Graph 10). Nevertheless, the near-term effect on the national index is expected to be limited as the *current* rate of inflation in each component is similar.

**Graph 9**  
Residential Construction Costs  
Year-ended growth



9 There are some similarities in labour, most notably in the 'finishing' components of construction such as internal painting, tiling and appliance installation.

**Graph 10**  
Higher-density Construction Costs\*  
Year-ended growth



## Conclusion

The growing share of apartments in Australia's housing mix has a wide range of implications for the analysis of dwelling investment, housing markets and price inflation. The response of the housing sector to changes in interest rates, as well as government policies, is also likely to have

changed. In particular, the longer and lumpier construction timelines for apartments mean the full influence of policy changes may take many years to be realised. The increase in apartment construction activity is a relatively recent development and so the understanding of these implications may evolve over time, particularly after a full cycle of activity is observed. ✖

## Box A

# Housing and the Consumer Price Index<sup>1</sup>

Housing plays an important role in the calculation of the CPI. ABS estimates suggest that more than one-fifth of all spending by Australian households is directed towards housing, and this is reflected in the weight of housing in the CPI. The purchase price of new owner-occupied dwellings has an effective weight of around 9 per cent in the CPI, while rent has a weight of around 7 per cent. These are the largest expenditure items in the CPI basket. Maintenance and property charges, and utilities (including electricity, gas and water) account for a further 8 per cent of the basket. Importantly, the CPI excludes land, as land is treated as investment not consumption.

Owner-occupier housing is difficult to include in consumer price indexes. The methods used to measure these prices differ depending on the conceptual approach used, though none of the standard conceptual approaches to measuring price indexes include the cost of existing dwellings. The CPI is primarily used as a macroeconomic indicator to monitor and

evaluate levels of inflation in the Australian economy (ABS 2017b). The ABS has stated that the most appropriate way to measure household inflation is to use the 'acquisitions' approach. The RBA has previously stated it 'strongly supported' the acquisition approach used by the ABS, consistent with the CPI being a general measure of household inflation (RBA 2010). This approach defines the basket of goods and services as consisting of all those consumer goods and services actually acquired by households during the base period.

The ABS also publishes a range of indices designed to measure changes in living costs of different groups in the community. These 'living cost' indices are calculated for selected representative households including employees, pensioners and self-funded retirees. These indices are calculated using the 'outlays' approach, which measures out-of-pocket expenses. Specifically, it defines the consumption basket in terms of the actual amounts paid out by households during the base period to gain access to consumer goods and services. 'Cost-of-use' is the third main conceptual measurement approach, based on

<sup>1</sup> This box draws on material from ABS (2017b). The authors would also like to thank Martin McCarthy (Economic Analysis Department) for his contribution.

the basket of consumer goods and services actually consumed in the base period, regardless of when they were acquired or paid for.

The practical differences between the acquisitions and outlays approaches are limited for most areas of household consumption. However, there are important differences in the measurement of owner-occupied housing costs, particularly relating to the inclusion of interest charges. The acquisitions approach, used for the CPI, measures owner-occupier housing costs as the net acquisition of new dwellings excluding land. This includes both the cost of detached and attached dwellings such as apartments (as of the March quarter 2017). This assumes the cost of the structure is the consumable item, while the cost of land is investment.

Under the outlays approach, used for the ABS living cost indices, owner-occupier housing costs are measured as mortgage interest charges, not the cost of constructing a dwelling. Mortgage charges will be affected by the prices of existing dwellings as they affect the current level of mortgage debt, but will also be affected by mortgage interest rates. The ABS estimates that the rise in dwelling prices over the past decade has been more than offset by the fall in interest rates, so mortgage charges have fallen (Graph A1). The inclusion of interest charges in the CPI is problematic for both conceptual and practical reasons. The main conceptual issue is that interest charges represent a relative price (that of consumption in the future as opposed to the present), rather than the current price of a good or service. The main practical problem is that the interest charges as measured tend to distort the signal offered by the CPI of inflationary trends, by incorporating the policy responses to those trends.

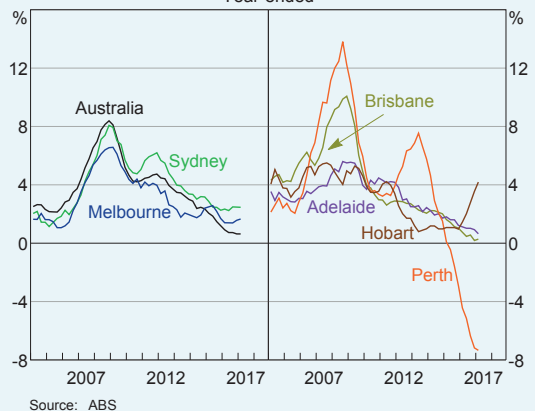
Under the 'cost-of-use' approach, statistical agencies often assume that the cost of housing

is equal to the rent that the household would receive for that dwelling, so they measure it as an 'imputed rent'. The use of imputed rents is fairly common internationally. Rent inflation in the CPI provides a rough indication of what this might look like in the Australian context. Rent inflation is around levels last seen in the mid 1990s, with relatively weak outcomes across most cities and strong deflation recently in Perth (Graph A2). The increase in supply of new housing in some cities is putting downward pressure on rents. ↘

**Graph A1**  
Mortgage Interest Charges\*  
2011/12 average = 100



**Graph A2**  
Rent Inflation  
Year-ended



## References

- ABS (Australian Bureau of Statistics) (2016)**, 'Average Dwelling Completion Times', Feature Article in 'Building Activity, Australia, Jun 2016', ABS Cat No 8752.0.
- ABS (2017a)**, 'Measuring Price Change of Attached Dwellings in the CPI', Feature Article in 'Consumer Price Index, Australia, Dec 2016', ABS Cat No 6401.0, pp 11–16.
- ABS (2017b)**, 'What Role Does Housing Play in the Consumer Price Index and Selected Living Cost Indexes?', Feature Article in 'Selected Living Cost Indexes, Australia, Mar 2017', ABS Cat No 6467.0.
- Hsieh W, D Norman and D Orsmond (2012)**, 'Supply-side Issues in the Housing Sector', *RBA Bulletin*, September, pp 11–19.
- Leal H, S Parsons, G White and A Zurawski (2017)**, 'Housing Market Turnover', *RBA Bulletin*, March, pp 21–30.
- RBA (Reserve Bank of Australia) (2010)**, 'Submission to the 16th Series Review of the Consumer Price Index', Submission to the ABS 16th Series Review of the Consumer Price Index, 17 March.
- RBA (2014a)**, 'The RBA's Business Liaison Program', *RBA Bulletin*, September, pp 1–5.
- RBA (2014b)**, 'Submission to the Inquiry into Affordable Housing', Submission to the Senate Economics References Committee Inquiry into Affordable Housing, 14 February.
- RBA (2016)**, 'Box B: Chinese Demand for Australian Property', *Financial Stability Review*, April, pp 30–32.
- RBA (2017)**, 'Box A: The Pipeline of Residential Dwelling Work', *Statement on Monetary Policy*, February, pp 36–37.
- Shoory M (2016)**, 'The Growth of Apartment Construction in Australia', *RBA Bulletin*, June, pp 19–26.



# Estimating the NAIRU and the Unemployment Gap

Tom Cusbert\*

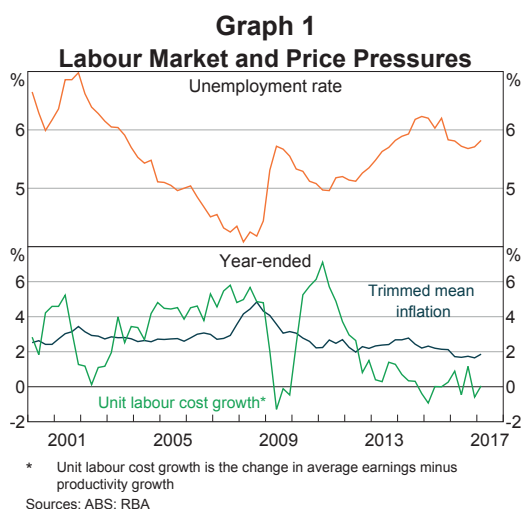
Spare capacity in the labour market is an important input into forecasts of inflation and wage growth. This article describes how the Bank estimates one measure of spare capacity in the labour market – the gap between the unemployment rate and the non-accelerating inflation rate of unemployment (NAIRU). Model estimates of the NAIRU are highly uncertain and can change quite a bit as new data become available. The estimates suggest that the NAIRU has declined since the mid 1990s and is currently around 5 per cent.

## What Is the NAIRU and Why Is It Important?

Labour underutilisation is an important consideration for monetary policy. Spare capacity in the labour market affects wage growth and thus inflation (Graph 1). Reducing it is also an end in itself, given the Bank's legislated mandate to pursue full employment. The NAIRU – or non-accelerating inflation rate of unemployment – is a benchmark for assessing the degree of spare capacity and inflationary pressures in the labour market. When the observed unemployment rate is below the NAIRU, conditions in the labour market are tight and there will be upward pressure on wage growth and inflation. When the observed unemployment rate is above the NAIRU, there is spare capacity in the labour market and downward pressure on wage growth and inflation. The difference between the unemployment rate and the NAIRU – or the 'unemployment gap' – is therefore an important input into the forecasts for wage growth and inflation.

In practice, the NAIRU – and therefore the unemployment gap – are not observed. This

\* The author is from Economic Analysis Department.



article sets out how the Bank currently estimates the NAIRU for the purpose of forecasting wage growth and inflation, and how estimates of the NAIRU have changed over time.<sup>1</sup>

The NAIRU can be defined in various ways and is sometimes used interchangeably with the broader concept of the unemployment rate associated with 'full employment'. In this article we use a

<sup>1</sup> The current estimation method builds on earlier work. See Gruen, Pagan and Thompson (1999) and Ballantyne, De Voss and Jacobs (2014) for details.



narrower definition and define the NAIRU as the unemployment rate that is consistent with inflation converging to the rate of long-term inflation expectations in the economy. This approach has proven useful for modelling inflation. Other approaches to estimating the NAIRU (or full employment) are intuitively appealing but less useful for modelling inflation. For example, the NAIRU can be modelled as a function of observable variables like labour market regulation (e.g. minimum wages), union membership rates, the level of unemployment benefits, and demographics. Another approach defines full employment using types of unemployment, which can be linked to observable characteristics. Full employment occurs when there is no cyclical unemployment, and the only unemployment is either structural or frictional (e.g. Ballantyne *et al* 2014). Models can include labour market dynamics such as longer durations of unemployment leading to skills atrophy and decreased employability (e.g. Ball 2009). Some researchers connect the NAIRU to the rates at which employees find and leave jobs (e.g. Dickens 2009). These other methods can be used for exploring the economics of why the NAIRU might change. However, the method in this article aims only to detect changes in the NAIRU, not explain them.

## Estimating the NAIRU

The NAIRU is not observable, but we can infer it from the relationship between the unemployment rate and inflation (or wage growth). In this article, the NAIRU is the unemployment rate at which inflation converges to the level of long-run inflation expectations. If the NAIRU was constant over time, it could be estimated using a simple regression of inflation against the unemployment rate.<sup>2</sup> However, evidence suggests that the NAIRU

changes over time and models that allow the NAIRU to vary generally have greater predictive power for inflation and wage growth (e.g. Gruen *et al* 1999; Ball and Mankiw 2002).

To estimate a NAIRU that varies over time requires a more complex model. Inflation and wage growth are affected by the unemployment gap (among other things). The gap cannot be observed directly, but the relationship between the unemployment gap and inflation means we are able to infer changes in the gap by observing inflation outcomes, controlling for other things. More concretely, if inflation is lower than expected, a possible explanation is that the unemployment gap was larger than we thought. In response, we might lower our estimate of the NAIRU. We use a statistical technique known as the Kalman filter to calculate how much we should revise our estimate of the NAIRU based on new data. For example, our model suggests we should increase our estimate of the NAIRU by just over  $\frac{1}{4}$  of a percentage point in response to quarterly inflation being  $\frac{1}{2}$  percentage point higher than expected in that quarter.

The unemployment gap also affects wage growth. Conceptually, the NAIRU should be the same whether we use inflation or wage growth to estimate it. However, in practice, the estimate varies if you use inflation or use wage growth (e.g. Gruen *et al* 1999 and Ballantyne *et al* 2014). The method used here derives a single estimate of the NAIRU using information from both inflation and wage growth.

## The model

The model comprises separate equations for inflation, wage growth and the NAIRU. Inflation and wage growth are modelled using lags of themselves and each other, long-term inflation expectations, the unemployment gap, the change in the unemployment rate, and import prices (more details in Appendix A). Oil prices

2 In this case, the estimate of the constant NAIRU since 1966 would be 4½ per cent. This is found by estimating the NAIRU as a parameter in the inflation and wage equations in Appendix A, and then averaging them together.

appear in both equations, but only prior to 1977 when they were correlated with large changes in prices and wages.<sup>3</sup> Inflation is measured by quarterly trimmed mean inflation. Wage growth is measured by growth in unit labour costs (ULCs), defined as average earnings growth adjusted for productivity growth. Strictly speaking, the ULC measure used here includes more than just wages. By incorporating productivity as well, it becomes more relevant for inflation forecasting. The model also includes an equation for the evolution of the unobservable NAIRU. We do not model the structural determinants of the NAIRU. The baseline assumption is that it will stay constant in the next period.

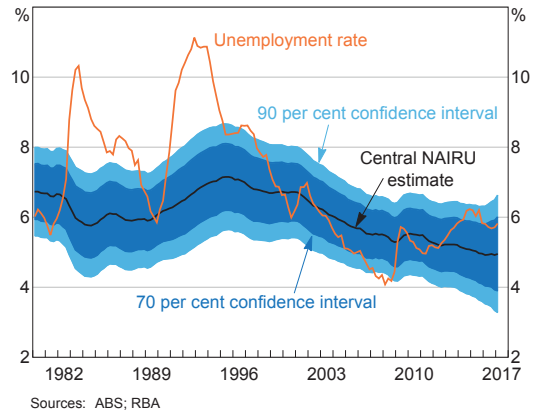
### The NAIRU estimates

Central estimates of the NAIRU from the model, as well as the uncertainty around these estimates, are presented in Graph 2. The estimated NAIRU peaked in 1995 at just over 7 per cent of the labour force and has declined more or less steadily since then to around 5 per cent in early 2017. While the structural determinants of the NAIRU are not modelled here, other research has attempted to explain changes in the NAIRU. The results of that research are far from conclusive, but OECD studies provide some possible explanations.<sup>4</sup> Those studies suggest that the increase in unemployment benefits as a share of average wages from the mid 1970s to the early 1990s, and their subsequent decline, influenced the rise and fall in the NAIRU. Decreases in trade union membership and product market regulation are also estimated to have lowered the NAIRU since the mid 1990s. The studies did not

3 The strong correlation between oil prices and inflation and wage growth seemed to break down after the first oil shock. This may have been due to changes in institutional arrangements or a decreased share of oil in production, but our motivation is mostly empirical so the precise explanation is not important here. Oil prices do affect headline inflation, but that is not modelled here.

4 See Bassanini and Duval (2006) and Gianella *et al* (2008) for details.

**Graph 2**  
**NAIRU Estimate**  
Per cent of labour force



find any evidence that the level of the minimum wage affected the NAIRU.

Economic conditions may also have delayed effects on the NAIRU. Long periods of unemployment can decrease an individual's future employment opportunities, perhaps because of real or perceived skills attrition. These long periods out of work tend to occur more often when the unemployment rate is high. This process – known as hysteresis – can raise structural unemployment and often follows rapid increases in the unemployment rate during recessions. When the labour market is tight, employers are more likely to hire workers with less desirable work histories or characteristics. A period of employment often improves a person's future job prospects, which may lower structural unemployment. In Australia, the rise in the estimated NAIRU between 1984 and 1995 occurred alongside two recessions. Conversely, the fall in the NAIRU over the past 20 years has occurred during a prolonged period of economic growth.

We can use the central estimates of the NAIRU to construct estimates of the unemployment gap. The relatively smooth evolution of the estimated NAIRU through time suggests that most of

the short-term variation in the unemployment gap comes from observable changes in the unemployment rate.<sup>5</sup> It also suggests that movements in the NAIRU have been driven by slow-moving structural features of the labour market, which are typically hard to observe.

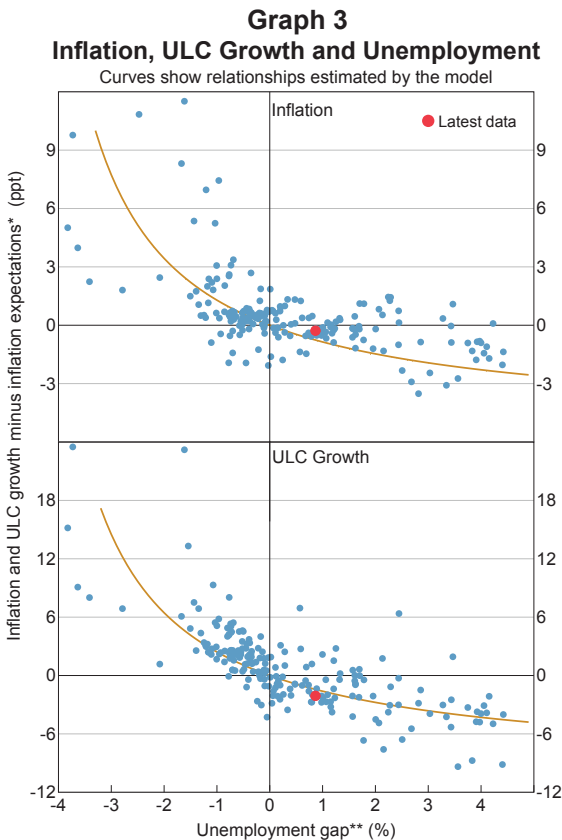
The relationship between the estimated unemployment gap and inflation, relative to long-run expectations, is shown in Graph 3. As expected, inflation tends to be higher when the unemployment gap is negative (i.e. when the observed unemployment rate is below the NAIRU). Similarly, wage growth tends to be higher when the unemployment gap is

negative. Both relationships are nonlinear, so increases in the unemployment gap have less of an effect on inflation and wage growth as the unemployment gap increases. If there are already many unemployed workers looking for a job, a few more are unlikely to have much effect on the wage offered.

**NAIRU estimates are uncertain, especially in real time**

Estimates of the NAIRU are uncertain because it cannot be observed and the data provide only a noisy signal. The current estimate of the NAIRU is 5.0 per cent of the labour force, with a 70 per cent confidence interval of plus or minus 1 percentage point. This means that, even if the models of inflation and wage growth are right, there is still a 30 per cent chance that the ‘true’ unobserved NAIRU is either higher than 6 per cent or lower than 4 per cent (Graph 2). Given the March quarter unemployment rate of 5¾ per cent, the model suggests an 80 per cent chance that the unemployment rate is above the NAIRU.

The central estimates of the NAIRU presented in Graph 2 use the full history of the data. However, the path of the NAIRU estimated now can look quite different to the path estimated at various times in the past, even using the same model and data history. The high degree of uncertainty around the NAIRU estimates means new data can change the estimate of the NAIRU for the previous few years. Graph 4 shows how the revisions to the NAIRU estimate have unfolded over time.<sup>6</sup> Each series shows the NAIRU estimate based on the data up to that time period. For example, the estimates made using data up to the December quarter of 2015 showed the NAIRU had been fairly



\* Year-ended trimmed mean inflation and ULC growth minus long-term inflation expectations

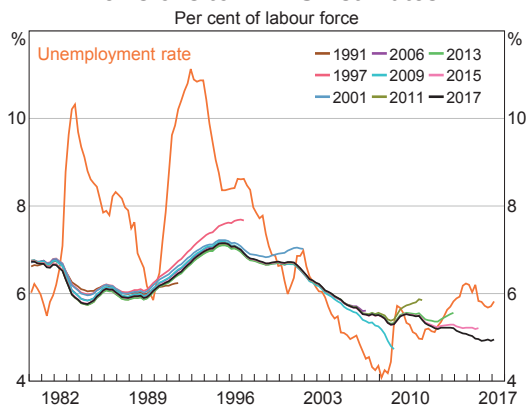
\*\* Unemployment rate minus estimate of the NAIRU

Sources: ABS; RBA

5 The variability of the NAIRU is estimated from the data, rather than being assumed by the statistical procedure.

6 Graph 4 shows a selection of estimates of through time. An animated version of this graph showing the full history of estimates is here: <<https://www.rba.gov.au/publications/bulletin/2017/jun/bu-0617-2-graph.html>>.

**Graph 4**  
Revisions to NAIRU Estimates\*



\* Each series shows the estimates using data up to the period when the series ends

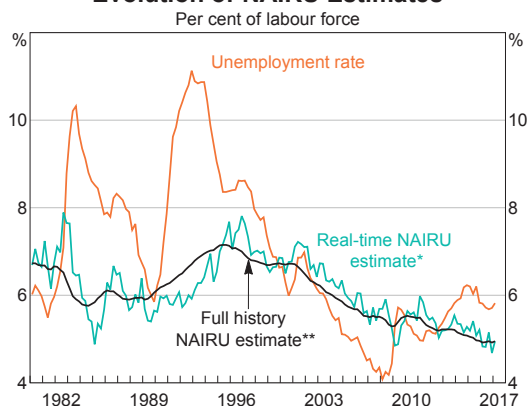
Sources: ABS; RBA

flat over the previous two years and was around 5.2 per cent. But by the March quarter of 2017, the latest estimates show the NAIRU had been falling over that same period and was 5.0 per cent in the March quarter of 2015.

When updating the economic forecasts each quarter, Bank staff use the latest estimate of the NAIRU as an input into the forecasts for inflation and wage growth. Because of the uncertainty around the NAIRU, the estimates generated by incorporating new data each quarter can move around much more sharply than the estimates made with the benefit of hindsight and the full history of the data. Graph 5 shows estimates of the NAIRU through time that use only the data available up to that time period, compared with estimates that use the full data history. The real-time series shows the estimate of the NAIRU the model would have made for each quarter at that time. These real-time estimates give a better sense of the uncertainty faced by forecasters than the estimates using the full history.<sup>7</sup>

7 A further source of real-time uncertainty is that new data can cause revisions to parameter estimates. Each new data point allows the parameters as well as the NAIRU to be re-estimated. However, over the past two decades the contribution of parameter re-estimation to real-time uncertainty has been very small.

**Graph 5**  
Evolution of NAIRU Estimates



\* Uses data up to the quarter of the estimate

\*\* Uses entire data series to make the estimates

Sources: ABS; RBA

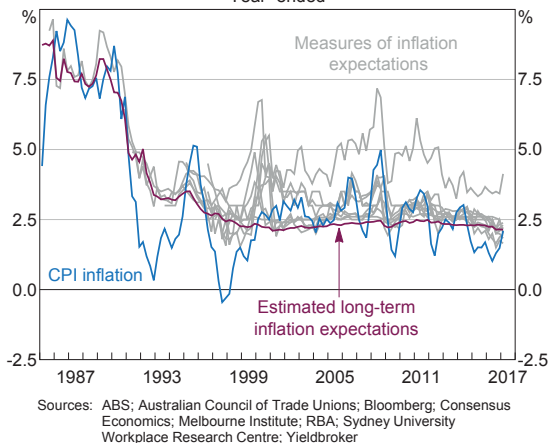
## Inflation expectations and the NAIRU

In the model, the unemployment gap drives deviations of inflation and wage growth from long-term inflation expectations. This means that estimated movements in the NAIRU depend on which measure of inflation expectations is used. Previous versions of the model used inflation expectations derived from 10-year bond rates. Moore (2016) examines a wide range of measures of inflation expectations available in Australia. Expectations measures derived from bond rates do not purely reflect inflation expectations because they also include risk and liquidity premia. Each measure has pros and cons, so in this model we combine a range of measures of inflation expectations (Graph 6). Specifically, we extract a common signal of long-term expectations from the various measures after controlling for each measure's co-movement with recent inflation.<sup>8</sup>

The *average level* of the inflation expectations measure used in the model also affects the level of the NAIRU estimates. Many of the measures of inflation expectations appear to be upwardly

8 See Kozicki and Tinsley (2012) and Chan, Clark and Koop (2015) for details of similar estimates made on US data.

**Graph 6**  
**Inflation Expectations**  
 Year-ended



biased (as tends to be the case for other economies), which would result in a downward bias in the NAIRU estimate. To avoid this problem, we adjust the mean of the estimated inflation expectations series to match the mean of inflation since 1996, which is roughly the period when expectations appear to have been anchored around the inflation target.

## The NAIRU and Recent Weakness in Wage Growth

Our model of inflation and wage growth accounts for the effects of a number of observable variables. However, there are other variables that can affect inflation and wage growth that are not included in the model (for example, because of insufficient data). If these omitted variables change and cause inflation or wage growth to deviate from the model predictions, some of this deviation will be attributed to changes in the NAIRU. Therefore the model's estimate of the NAIRU could change, even though the 'true' unobservable NAIRU might not have.

Recent RBA work has considered some possible explanations for low wage growth that do not correspond to variables in the model.<sup>9</sup> Decreased bargaining power of labour and relatively high underemployment are two of the explanations canvassed. We look at how these explanations could affect model estimates of the NAIRU.

### Decreased employee bargaining power

If employees have less bargaining power, then one would expect to see lower wage growth (all else equal). Because bargaining power is not in the model, wage growth would be lower than predicted and the NAIRU estimate would fall. If a reduction in bargaining power is sustained, the NAIRU estimate would continue to fall. A permanent decrease in bargaining power would lead the NAIRU to decline to a lower level reflecting decreased wage pressures at any given unemployment rate. However, if bargaining power were to increase after a temporary reduction, wage growth would start surprising the model on the upside and the estimate of the NAIRU would increase again.

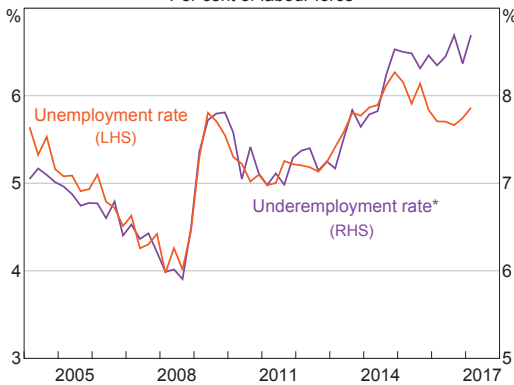
Bargaining power is not an observable variable. This means that the model cannot tell us whether any given change in the NAIRU is caused by a change in bargaining power. The model deals with this by treating all unmodelled changes in wage growth the same way. It estimates how much of each change is temporary versus how much is permanent, based on historical experience.

### Relatively more underemployment

The underemployment rate measures the number of employed people who would like, and are available, to work additional hours, expressed as a share of the labour force (Graph 7).

<sup>9</sup> See Lowe (2016), Davis, McCarthy and Bridges (2016) and Bishop and Cassidy (2017).

**Graph 7**  
**Labour Underutilisation**  
 Per cent of labour force



\* Full-time workers on reduced hours for economic reasons and part-time workers who would like, and are available, to work more hours  
 Source: ABS

The model in this article does not include the underemployment rate, but it does include the unemployment rate.<sup>10</sup>

Between 2004 and 2014, the underemployment rate tended to move fairly closely with the unemployment rate. This meant the unemployment rate was a reasonable proxy for any effect that changes in the underemployment rate had on wage growth. Over the past few years, however, the underemployment rate has been relatively stable while the unemployment rate has declined. Any effect of the underemployment rate on wage growth –

over and above the effect of the unemployment rate – would result in lower wage growth than expected by the model. This would then cause the model's estimate of the NAIRU to decline. This explanation implies that the unemployment gap, as measured using the unemployment rate, is currently understating the degree of spare capacity in the labour market. The model estimate of the NAIRU is then revised down to get a larger unemployment gap.

## Conclusion

Estimates of the NAIRU are an input into the Bank's inflation and wage forecasts, which in turn feed into monetary policy decisions. The model-based estimates of the NAIRU presented in this article do not rely directly on structural features of the labour market, but are inferred from departures from the expected relationship between unemployment and inflation or wage growth. There is substantial uncertainty around these estimates of the NAIRU, especially in real time. This uncertainty means that the model's estimate of the NAIRU can change quite a bit from quarter to quarter as new data become available, even though we think the 'true' unobserved NAIRU actually evolves quite slowly. ✎

<sup>10</sup> Inflation models do not typically include the underemployment rate, in part because it tends to be correlated with the unemployment rate. Further research is looking into separately identifying the effects of underemployment.

## Appendix A: Estimating the Model

The model comprises equations for inflation and wage growth as well as for the NAIRU. Details of the variables used are in Table A1.

$$\begin{aligned} \Delta p_t = & \delta_p \Delta p_t^e + \sum_{k=1}^3 \beta_k \Delta p_{t-k} + \phi \Delta ulc_{t-1} \\ & + \gamma_p \frac{(U_t - NAIRU_t)}{U_t} + \lambda_p \frac{\Delta U_{t-1}}{U_t} \\ & + \alpha_1 (\Delta_4 p_{t-1}^m - \Delta_4 p_{t-2}^m) + D_{76} \psi_p \Delta oil_{t-2} + \epsilon_t^p \quad (A1) \end{aligned}$$

$$\begin{aligned} \Delta ulc_t = & \delta_{ulc} \Delta p_t^e + \omega_1 \Delta p_{t-1} + \omega_2 \Delta p_{t-2} \\ & + \gamma_{ulc} \frac{(U_t - NAIRU_t)}{U_t} + \lambda_{ulc} \frac{\Delta U_{t-1}}{U_t} \\ & + D_{76} \psi_{ulc} \Delta oil_{t-2} + \epsilon_t^{ulc} \quad (A2) \end{aligned}$$

$$NAIRU_t = NAIRU_{t-1} + \epsilon_t^{NAIRU} \quad (A3)$$

We estimate the model by maximum likelihood using the Kalman filter. Given the parameters, and an initial value for the NAIRU in 1968, the Kalman

filter generates estimates of the NAIRU based on the data available up to each time period. The NAIRU is then projected forward one period (as per Equation (A3)). Along with the observable variables, this generates a prediction for inflation and wage growth for the period ahead (as per Equations (A1) and (A2)). Any difference between the prediction and the actual data will cause some revision to the NAIRU estimate for that quarter. The process is then repeated for the next quarter.

Stepping through the quarters gives a series of prediction errors, which depend on the parameter values. The maximum likelihood estimation routine finds the parameters that minimise those errors and give the best fit to the inflation and wage growth data. The results of estimation are in Table A2.

A statistical smoothing method is then used to construct the estimates based on the full history of the data. The smoothing method steps backward in time from the current period, updating the real-time NAIRU estimates in light of more recent data.

**Table A1: Variable Descriptions and Data Sources**

Variable	Description	Source
$\Delta p_t$	Quarterly trimmed mean inflation; prior to 1978 it is weighted median inflation	ABS
$\Delta p_t^e$	Long-term inflation expectations (on a quarterly basis)	Separate model estimates
$\Delta ulc_t$	Quarterly unit labour costs growth, defined as growth of average earnings less productivity growth	Constructed from ABS data
$U_t$	Unemployment rate	ABS
$\Delta_4 p_{t-1}^m$	Year-ended growth in the consumer imports price deflator	ABS
$\Delta oil_t$	Quarterly log change in Brent oil price (multiplied by 100)	Thomson Reuters
$NAIRU_t$	Current estimate of the non-accelerating inflation rate of unemployment	
$D_{76}$	A dummy variable that is one prior to 1977	
$\epsilon_t^p$	The error in the inflation equation	
$\epsilon_t^{ulc}$	The error in the ULC equation	
$\epsilon_t^{NAIRU}$	The error in the NAIRU equation	

Source: RBA

**Table A2: Parameter Estimates**  
Estimation sample is March 1968 to March 2017

	Inflation equation		ULC growth equation	
	Coefficient <sup>(a)</sup>	Standard error	Coefficient <sup>(a)</sup>	Standard error
$\Delta p_t^e$	0.35***	0.06	0.45**	0.22
$\Delta p_{t-1}$	0.24***	0.06	0.47**	0.22
$\Delta p_{t-2}$	0.16***	0.05	0.09	0.16
$\Delta p_{t-3}$	0.18***	0.06		
$\Delta ulc_{t-1}$	0.06***	0.02		
$\frac{\Delta U_{t-1}}{U_t}$	-0.70	0.53	-5.6***	1.7
$\frac{U_t - U_t^*}{U_t}$	-0.38***	0.10	-1.9***	0.53
$\Delta_4 p_{t-1}^m - \Delta_4 p_{t-2}^m$	0.004	0.006		
$\Delta oil_{t-2}^{(b)}$	0.02***	0.01	0.05***	0.01
$\sigma_{measurement}^{(c)}$	0.30***	0.02	1.17***	0.06
<b>NAIRU equation</b>				
	Coefficient <sup>(a)</sup>		Standard error	
$\sigma_{NAIRU}^{(c)}$	0.40***		0.13	

(a) \*, \*\* and \*\*\* denote *P* values less than 0.1, 0.05 and 0.01 respectively

(b) Prior to 1977 only

(c) Standard deviation estimates, the errors are assumed to be distributed normally with mean zero and variance  $\sigma^2$

Source: RBA

## References

**Ball L (2009)**, 'Hysteresis in Unemployment: Old and New Evidence', NBER Working Paper No 14818.

**Ball L and G Mankiw (2002)**, 'The NAIRU in Theory and Practice', *Journal of Economic Perspectives*, 16(4), pp 115–136.

**Ballantyne A, D De Voss and D Jacobs (2014)**, 'Unemployment and Spare Capacity in the Labour Market', *RBA Bulletin*, September, pp 7–20.

**Bassanini A and R Duval (2006)**, 'Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions', OECD Social, Employment and Migration Working Papers No 35.

**Bishop J and N Cassidy (2017)**, 'Insights into Low Wage Growth in Australia', *RBA Bulletin*, March pp 13–20.

**Chan J, T Clark and G Koop (2015)**, 'A New Model of Inflation, Trend Inflation, and Long-Run Inflation Expectations', Federal Reserve Bank of Cleveland Working Paper No 15–20.

**Davis K, M McCarthy and J Bridges (2016)**, 'The Labour Market during and after the Terms of Trade Boom', *RBA Bulletin*, March, pp 1–10.

**Dickens W (2009)**, 'Has the Recession Increased the NAIRU?', Brookings Report.



**Gianella C, I Koske, E Rusticelli and O Chatal (2008),** 'What Drives the NAIRU? Evidence from a Panel of OECD Countries', OECD Economics Department Working Papers No 649.

**Gruen D, A Pagan and C Thompson (1999),** 'The Phillips Curve in Australia', RBA Research Discussion Paper 1999-01.

**Kozicki S and P Tinsley (2012),** 'Effective Use of Survey Information in Estimating the Evolution of Expected Inflation', *Journal of Money, Credit and Banking*, 44(1), pp 145–169.

**Lowe P (2016),** 'Inflation and Monetary Policy', Address to Citi's 8th Annual Australian & New Zealand Investment Conference, Sydney, 18 October.

**Moore A (2016),** 'Measures of Inflation Expectations in Australia', *RBA Bulletin*, December, pp 23–31.

# Australian Capital Flows

Susan Black, Blair Chapman and Callan Windsor\*

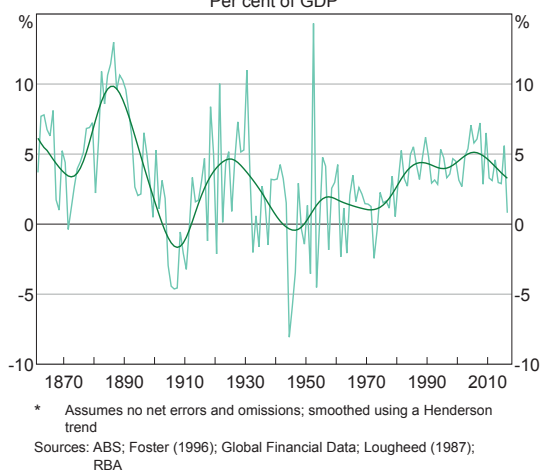
Capital inflows have underpinned the expansion of Australia's productive capacity for the past 200 years or more. Recently, there have been three noteworthy changes in the composition of these flows. First, most inflows to the mining sector are now direct funding from offshore, rather than reinvested earnings. Second, foreign investors have been more actively managing their holdings of Australian government debt securities. Third, regulatory reforms have led to changes in banks' short-term debt funding.

## Introduction

Over a long period of time, investment in the Australian economy has been greater than domestic saving. The difference has been made up by net capital inflows from abroad – the financial counterpart to the current account deficit (Graph 1). This has been possible because of the favourable risk-adjusted returns in Australia (Belkar, Cockerell and Kent 2007). Cross-border investment has played an important role in expanding the economy's productive capacity to meet growing demand for Australia's goods and services, such as during the recent mining investment boom. Australia's history of capital inflows reflects the net outcome of saving and investment decisions taken across all sectors of the Australian economy – by households, corporations and the general government sector – with these decisions affected by various domestic and international policy settings.<sup>1</sup>

Within Australia's history of net capital inflows, the underlying patterns have varied over time. As

**Graph 1**  
**Net Capital Inflows\***  
Per cent of GDP

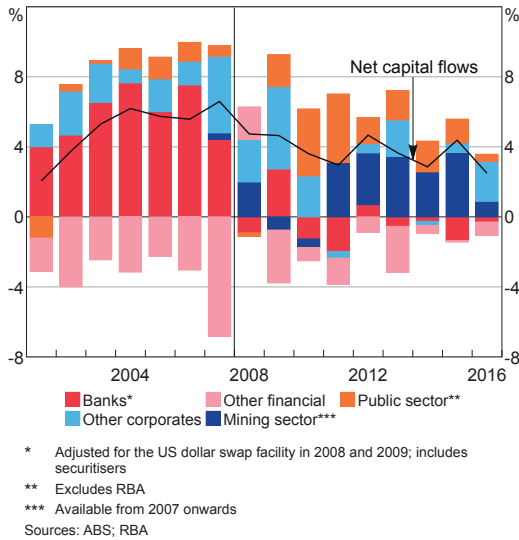


has been well documented, there were three notable developments between 2008 and 2013 (Graph 2) (Debelle 2014): (i) foreign direct investment in the mining sector during the investment boom increased; (ii) flows to the Australian banking sector declined from sizeable inflows in the lead-up to the global financial crisis, to around zero in the wake of the crisis; and (iii) foreigners increased their holdings of Australian government debt.

\* The authors are from International Department.

<sup>1</sup> For a detailed discussion of sectoral trends in national saving and investment in the Australian economy, see Bishop and Cassidy (2012).

**Graph 2**  
**Net Capital Inflows**  
Per cent of GDP



Although these trends have largely continued in recent years, there have been some notable changes in the composition of these net inflows (Table 1). This article discusses these changes in detail.<sup>2</sup> It also examines the historically large decline in the cost of servicing Australia's net foreign liability position, which itself represents the accumulation of net capital inflows and valuation effects.

## Mining Sector

Private non-financial corporations have been the largest recipient of foreign capital inflows to Australia for much of the past decade, receiving almost 90 per cent of all net foreign capital inflows since 2008. A large share of these inflows has been to fund investment in the resource sector, during both the investment phase of the mining boom – which peaked in Australia in late 2012 – and as large parts of the sector shifted to the production and export phase (Graph 3).

During the mining investment boom, a significant share of the expansion in productive capacity was funded through foreign direct investment in the form of reinvested earnings – essentially calculated as profits less dividends.<sup>3</sup> This was during a period when profitability in the mining sector was very high (and dividends were relatively low) and reflected the tendency for the mining sector to fund investment from internal sources (Arsov, Shanahan and Williams 2013). As the mining sector has a high degree of direct foreign ownership, the increase in profits did not generate an equivalent increase in Australia's disposable income and saving as measured in the national accounts (and so the increase in domestic saving was not

**Table 1: Net Capital Inflows<sup>(a)</sup>**  
Per cent of GDP

	Average over:		
	1998–2007	2008–13	2014–16
Private sector	5.0	2.3	2.3
Banks <sup>(b)</sup>	5.4	-0.2	-0.5
Other financials	-2.6	-1.2	-0.4
Other corporates	2.2	3.4	3.0
Mining sector	<i>na</i>	1.7	2.4
Public sector	-0.1	2.1	1.2
<b>Total</b>	<b>5.0</b>	<b>4.4</b>	<b>3.5</b>

(a) Excludes households and the RBA

(b) Adjusted for the US dollar swap facility in 2008 and 2009; includes securitisers

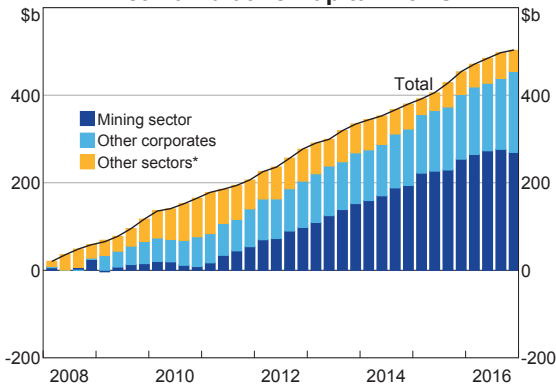
Sources: ABS; RBA

3 Specifically, under international balance of payments standards, reinvested earnings are calculated as net income (after tax and depreciation) less dividends less holding gains plus bad debt provisions.

2 This article expands upon many of the issues explored in Debelle (2017).

**Graph 3**

**Net Cumulative Capital Flows**



\* Includes general government, households, finance and insurance industry and unallocated flows

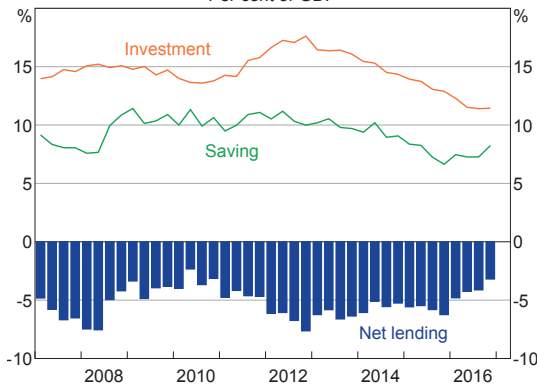
Sources: ABS; RBA

enough to fund the rapid increase in mining investment).<sup>4</sup> As such, there was a rise in the saving and investment gap of the non-financial corporate sector because of the mining sector (Graph 4).

**Graph 4**

**Corporate Saving and Investment\***

Per cent of GDP



\* Non-financial corporations

Source: ABS

As the counterpart to this, there were increased net capital inflows to the mining sector. This is because in the balance of payments, these reinvested earnings are generally treated as if they were distributed to foreign owners according to

4 For example, national corporate saving will only include half of the earnings retained by a mining company that is 50 per cent owned by foreign direct investors. The remaining earnings are paid overseas as 'reinvested earnings'.

their ownership share of the mining sector, which is high.<sup>5</sup> The foreign owners are then deemed to (notionally) reinvest back into the firm, which are recorded as capital inflows.<sup>6</sup> Strong capital inflows of this nature were observed over the period between 2008 and 2012. However, these were notional flows; reinvested earnings remain on business balance sheets in Australia for internal funding purposes and the money does not flow in and out of the country.

There have continued to be sizeable net inflows to the mining sector in recent years despite the substantial decline in mining investment (from 9½ per cent of GDP in 2012 to around 3½ per cent of GDP currently) and a decline in mining profits since the peak in commodity prices (Graph 5).

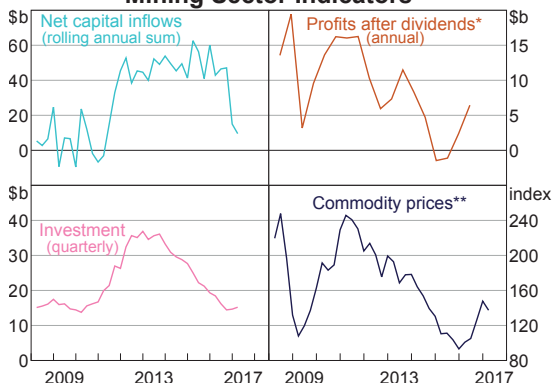
The continued capital inflows to the mining sector have been used to fund ongoing investment in large liquefied natural gas (LNG) projects. In recent years, LNG projects have made up a larger share of resource investment than previously and many of these projects have an even higher foreign ownership share than the overall sector. These LNG projects have typically involved new joint ventures where most participants are foreign entities and are likely to have limited existing domestic operations to generate profits to fund investment. Accordingly, these inflows have mostly been in the form

5 A range of estimates place this share at between 60–80 per cent, depending in part on the composition of the mining sector at any given time; the foreign ownership share for iron ore producers tends to be lower than the foreign ownership shares of coal and liquefied natural gas (LNG) producers.

6 Specifically, reinvested earnings that accrue to foreign owners that are direct investors (owning sufficient shares to have an effective voice in the decisions of the firm) appear as a notional income flow out of Australia in the net income component of the current account, along with an offsetting financial inflow for the notional reinvestment of these earnings. This treatment ensures international consistency. A controlling foreign owner's decision regarding the level of net income that is reinvested, or distributed as dividends, can vary significantly across jurisdictions due to different policy settings. If reinvested earnings were not attributed to controlling foreign owners in this way, then a jurisdiction with a higher level of reinvested earnings (for example, due to taxation policies) would also record a higher level of national saving.

Graph 5

Mining Sector Indicators



\* Announced dividends  
 \*\* RBA Index of Commodity Prices with spot bulks; 2015/16 = 100  
 Sources: ABS; Morningstar; RBA

of direct funding from offshore rather than reinvested earnings. In other words, money does actually flow into Australia.

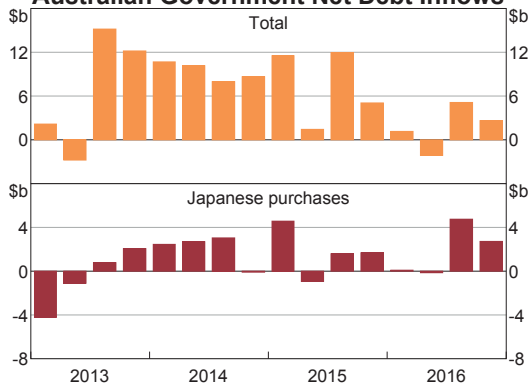
More recently, net capital inflows to the mining sector have started to taper off with the gradual transition of a number of large LNG projects from the investment phase into the production and export phase. Although the increase in exports will support profits, some of these profits are likely to be paid out to offshore owners as dividends rather than reinvested to further expand capacity.

### Public Sector

In the public sector, foreigners have continued to increase their holdings of Australian government debt over the past couple of years. Ongoing purchases of Australian government debt have partly been supported by flows from Japanese investors since late 2013 (Graph 6). These flows were largely because of a policy-related fall in the yield on Japanese government bonds, which encouraged Japanese investors to shift into foreign alternatives. For instance, large segments of the Japanese asset management sector – such as Japan’s Government Pension and Investment Fund – revised their asset allocation benchmarks

Graph 6

Australian Government Net Debt Inflows



Sources: ABS; Bank of Japan

to place a higher weight on international assets in their portfolios.

But flows into government bonds by foreign investors have moderated recently and have not kept pace with the increase in the issuance of these bonds by the Australian government.<sup>7</sup> The headline statistics show that the foreign ownership share of government bonds has declined by around 20 percentage points since its peak in 2012. While the share has indeed declined, the extent is overstated by this headline measure. Part of this decline is a reflection of foreigners more actively managing their government bond holdings, rather than a decreased appetite to hold Australian Government Securities (AGS). In particular, there has been an increase in collateralised lending of AGS by foreigners via repurchase agreements (repos) with Australian dealers.<sup>8</sup> Such lending activity increased from around \$5 billion in early 2012 to around \$30 billion currently.

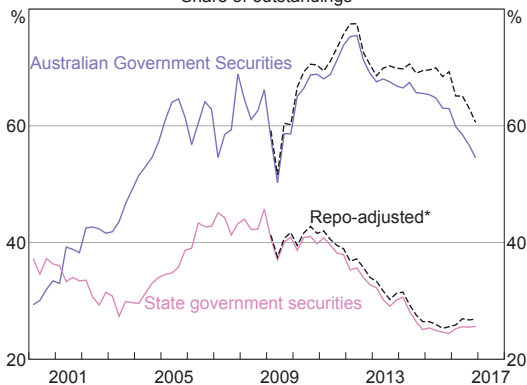
7 Correspondingly, the share of Australian government debt held by residents – specifically, local banks – has increased. The increase in domestic holdings of Australian government debt is almost entirely attributable to meeting prudential requirements – in particular the Liquidity Coverage Ratio, which requires banks to hold sufficient high-quality liquid assets to withstand a 30-day period of stress.

8 Repos involve the transfer of a security for cash with an undertaking to reverse the transaction at an agreed future date and price.

The collateralised lending of AGS for Australian dollars (or repo activity) is captured in the balance of payments statistics as a sale of AGS by a foreigner to their domestic counterparty. This is despite economic ownership remaining with the foreign lender, who has the obligation to buy back identical securities at some stage in the future. Adjusting the level of foreign ownership to account for this collateralised lending shows that the decline in the foreign ownership share of AGS has been around 5 percentage points smaller than recorded (Graph 7).

**Graph 7**

**Non-resident Holdings of Australian Public Debt**  
Share of outstandings



\* Includes securities held under repurchase agreements with Australian residents  
Sources: ABS; RBA

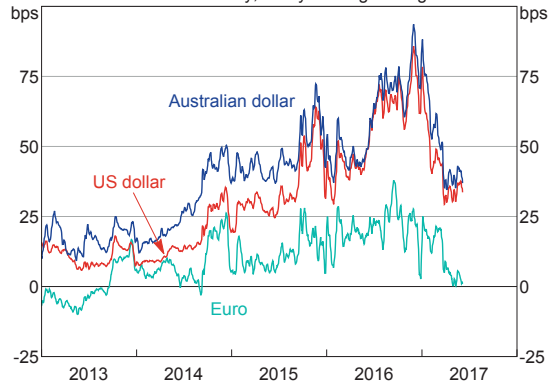
Foreigners started to more actively manage their AGS holdings over this period in part to take advantage of a trading opportunity in the foreign exchange market by swapping Australian dollars for Japanese yen (Becker, Fang and Wang 2016). Japanese institutional investors have been willing to pay a premium for foreign exchange – which is captured in the yen cross-currency swap basis (Graph 8).<sup>9</sup> This is because, as they diversify away from domestic assets and into foreign alternatives, they also want to hedge their exposure to foreign currency risk, which can be done using cross-currency swaps.

9 For a useful explainer on the mechanics of foreign currency swaps and cross-currency basis swaps, see Baba, Packer and Nagano (2008, p 82).

**Graph 8**

**Japanese Yen Cross-currency Swap Basis\***

3-month maturity, 5-day moving average



\* Positive value represents an additional return from borrowing yen  
Sources: Bloomberg; RBA

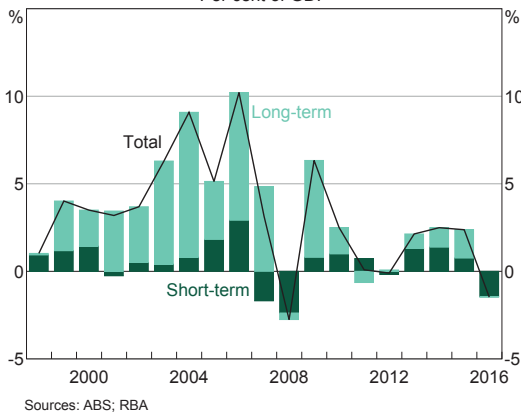
More recently, the attractiveness of this trading opportunity has declined, with the yen basis falling alongside a reduction in the demand for foreign currency assets from Japanese investors. Despite this, there has been continued demand for AGS from Japanese investors. The decline in the cost of borrowing Australian dollars in exchange for yen from a Japanese investor's perspective reflects the tight relationship between the Australian dollar borrowing cost and the US dollar borrowing cost. It may also indicate the possibility that Japanese asset managers may be investing in AGS unhedged, or only minimally hedged, against foreign currency risk.

**Banking Sector**

The aggregate pattern of capital flows to the banking sector has not changed materially in recent years following the shift in banks' funding towards domestic deposits and away from offshore wholesale debt that occurred in the wake of the global financial crisis. There have been minimal net capital flows to or from the banking sector over the past decade, with the funding composition of banks remaining very stable (see Graph 8 in Atkin and Cheung (2017)).

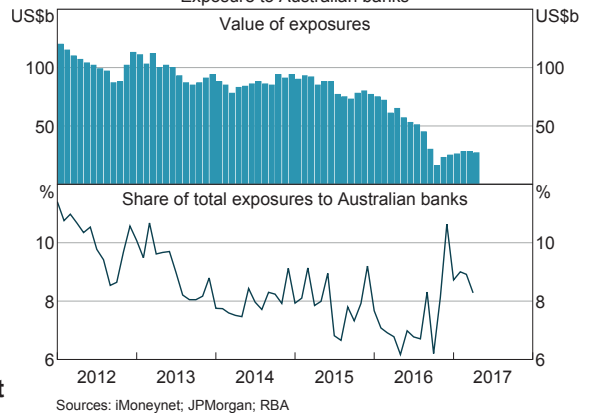
Notwithstanding this stability, there have been two noteworthy developments relating to short-term debt, both stemming from regulatory reforms. First, over the past year or so, Australian banks have reduced their short-term debt issuance in preparation for the introduction of the Net Stable Funding Ratio (NSFR) next year (Graph 9). The NSFR provides an incentive for banks to shift to sources of funding considered to be more stable and away from sources such as short-term wholesale liabilities.

**Graph 9**  
**Net Foreign Purchases of Australian Bank Debt**  
 Per cent of GDP



Second, international regulations have brought about a shift in the type of offshore investors that are funding Australian banks' short-term issuance. In particular, in the lead-up to the implementation of US money market fund (MMF) reforms by the US Securities and Exchange Commission in October 2016, the value of assets under management of prime MMFs (those that lend to banks) fell by US\$1 trillion or around 70 per cent. Of this, holdings of Australian bank debt declined by around US\$70 billion (Graph 10). In the midst of this decline, prime MMFs maintained the same share of their exposure to Australian banks relative to banks globally (at around 8 per cent of total MMF exposures to banks), but the absolute size of the decline was notable.

**Graph 10**  
**US Prime Money Market Funds**  
 Exposure to Australian banks



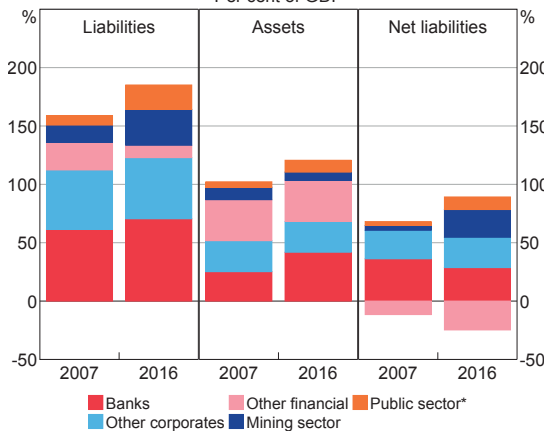
Nonetheless, Australian banks have been able to source funds from other investors with large cash holdings, such as US corporations in the technology sector. Accordingly, the short-term funding that Australian banks raise in commercial paper markets did not decline significantly in aggregate despite this shift in the investor base. The ability of Australian banks to readily find alternative investors for their short-term paper partly reflects the attractiveness of Australian bank paper from a risk-reward perspective.

### Australia's Net Foreign Liability Position

Australia's net foreign liability position measures the stock of Australia's foreign liabilities relative to the stock of Australian's holdings of foreign assets (Graph 11). As such, it represents the accumulation of Australia's net capital inflows and so will be affected by the flows discussed above as well as by relative asset price changes. When measured as a share of GDP, Australia's net foreign liability position was relatively stable for more than a decade to 2015, before increasing slightly more recently to be around 60 per cent of GDP.

Despite the relative stability in the aggregate position, there have been changes in the sectoral

**Graph 11**  
**Australia – External Position**  
Per cent of GDP

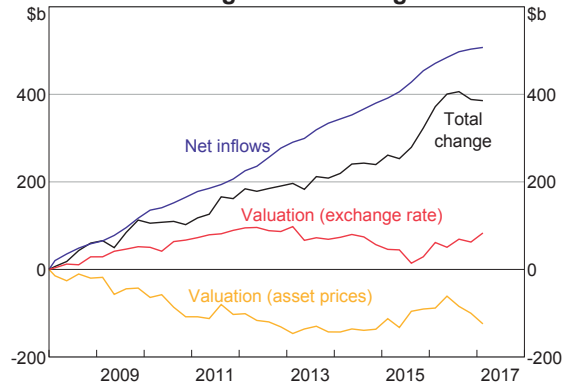


\* Includes RBA  
Sources: ABS; RBA

net liability positions, which largely mirror the trends in capital flows. Over the past decade or so, the public sector’s gross foreign liabilities have increased (by the equivalent of 14 percentage points of GDP to around 20 per cent of GDP) as has the stock of mining sector liabilities (by the equivalent of 20 percentage points of GDP over this period to be currently equivalent to about 25 per cent of GDP). For the banking sector, an increase in foreign liabilities has been offset by an increase in the stock of foreign assets held by banks, such that the net liability position has declined a little. In contrast to the other sectors, other financial corporations have a net foreign asset position, reflecting Australian superannuation funds’ large holdings of foreign assets.

Valuation effects have also been important (Graph 12). Over the period between 2008 and

**Graph 12**  
**Cumulative Change in Net Foreign Liabilities\***



\* Excludes other adjustments due to classification changes and write-offs  
Sources: ABS; RBA

2014, relative asset price movements improved Australia’s net foreign liability position. The value of Australia’s foreign assets increased by more than the value of foreigner’s holdings of Australian assets; for example, the S&P 500 US stock market index increased by around 25 per cent relative to a decline in the ASX 200 Australian stock market index of around 15 per cent over this period (Table 2). However, in recent years relative asset price movements have mostly contributed to an increase in the net foreign liability position. This was mostly driven by the increase in the value of Australian government debt over the period between 2014 and 2016; the yield on long-term AGS (which moves inversely to its price) declined by around 150 basis points, compared with a decline of around 60 basis points on US Treasuries with the same maturity.

**Table 2: Australia’s Net International Investment Position**  
Asset price effects

	S&P 500	ASX 200	10-year US Treasury	10-year AGS	USD per AUD	AUD TWI
	Per cent	Per cent	bps	bps	Per cent	Per cent
2008–14	25.9	-15.6	-100	-209	1.5	0.3
2014–16	21.1	5.9	-58	-147	-19.1	-7.2

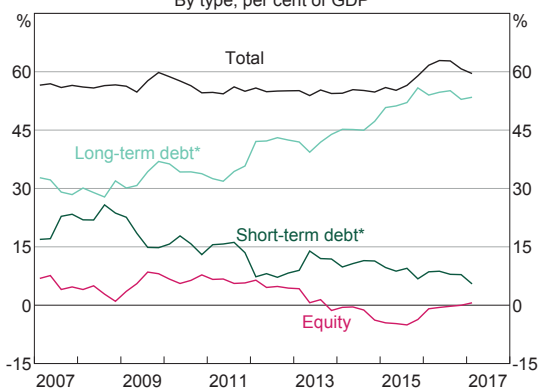
Source: Bloomberg



Fluctuations in the exchange rate have had a less pronounced effect on the foreign liability position over the past decade. The majority of Australian entities' foreign liabilities are denominated in Australian dollars, whereas most foreign assets are denominated in foreign currency, resulting in a net foreign currency *asset* position. As a result, a depreciation of the exchange rate tends to increase net assets measured in Australian dollar terms. The net foreign currency asset position is even more pronounced after hedging is taken into account. The broad-based appreciation of the Australian dollar (associated with the terms of trade and mining investment boom) to its peak in 2013 contributed to an increase in the foreign liability position, but this move was retraced as the Australian dollar depreciated.

In recent years, Australia's net *debt* liabilities have in fact been larger than its *total* net liabilities, given the shift to a small net equity asset position (Graph 13). Over 2013 to the end of 2016, the level of Australian investment in foreign equity exceeded the level of foreign investment in Australian equity. This was due to ongoing offshore equity investments by the Australian superannuation sector as well as the valuation effects mentioned earlier.

**Graph 13**  
**Net Foreign Liabilities**  
By type, per cent of GDP



\* Short-term includes debt with a residual maturity of one year or less; long-term includes all other debt  
Source: ABS

The share of Australia's foreign debt liabilities that is long term has risen noticeably over the past decade. Long-term debt liabilities have increased from around 30 per cent before the financial crisis to be around 50–55 per cent of GDP. The shift towards longer-term debt after the crisis was a result of two factors: banks lengthening the maturity of their debt on issue as well as the shift from bank debt towards government debt, which tends to have a relatively longer maturity (Stewart, Robertson and Heath 2013). Short-term debt liabilities are around their lowest share of GDP in over two decades.

### Net Income Deficit

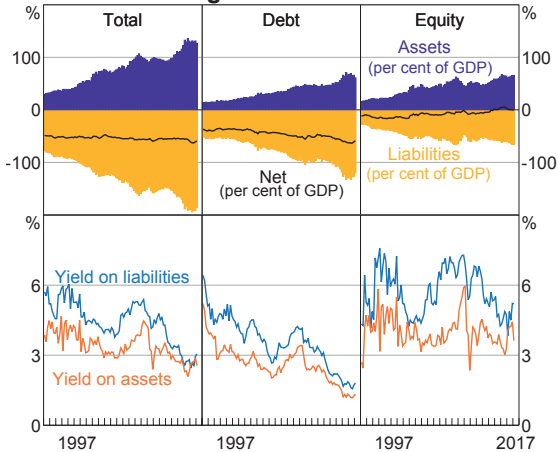
The net income deficit (NID) measures the cost of servicing the net liability position through interest payments and receipts on debt as well as dividends or reinvested earnings for equity. Australia has had an NID since at least 1960, which is a direct artefact of the net foreign liability position. It reflects the fact that the income paid on foreign holdings of Australian assets (such as interest paid by Australian banks on their foreign borrowings) is larger than the income received on Australian holdings of foreign assets (such as dividend income earned by Australian superannuation funds on their holdings of foreign equities).

The NID depends on two things: the stock of foreign assets and liabilities and the average yield paid on these positions. Accordingly, Australia's ongoing NID also reflects Australia's overall negative yield differential, with the yield received on Australian foreign assets lower than the yield paid to foreigners on their investments in Australia (Graph 14). For debt securities, the negative yield differential partly reflects the longer maturity of Australian liabilities compared with its foreign assets.<sup>10</sup> For equity liabilities, the

<sup>10</sup> The implied average yield understates the actual cost of foreign currency borrowing as it excludes the cost of hedging foreign exchange risk; these costs are accounted for elsewhere in the balance of payments.

**Graph 14**

**Gross Foreign Positions and Yields\***



\* Yields calculated using income flows divided by the stock of assets or liabilities  
Sources: ABS; RBA

negative yield differential is partly a reflection of taxation policies, particularly Australia’s system of dividend imputation, which encourages higher dividend payout ratios. Australian companies’ dividends are generally high by international standards (Bergmann 2016).<sup>11</sup>

From late 2010 to early 2016, Australia’s NID narrowed to be around its lowest level as a per cent of GDP since the Australian dollar was floated (Graph 15). This narrowing, as well as the recent shift in the trade balance to a surplus, has led to the narrowing of the current account deficit to its lowest share of GDP since the early 1980s. There were two distinct periods behind the decline in the NID, with different drivers in each period.

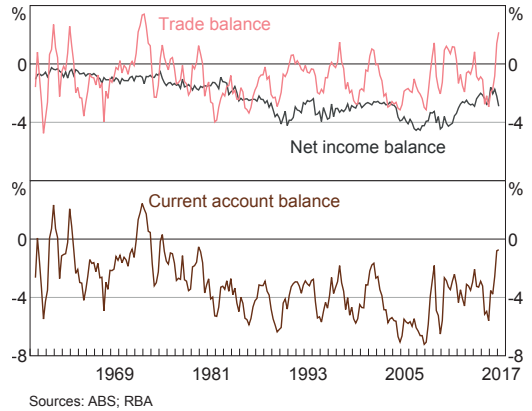
The narrowing in the NID from late 2010 to late 2013 was mostly because of a decline in income payments on Australia’s foreign debt and equity liabilities (Ma 2014) (Graph 16). The lower average yield paid on Australian foreign debt was due to both a decrease in Australian interest

<sup>11</sup> It is important to note that higher nominal payments on liabilities compared to assets need not necessarily imply a loss of wealth. For example, over the long run, relatively low dividend flows to Australian holders of foreign equity assets would tend to be associated with higher revaluation gains for Australian holders of those assets.

**Graph 15**

**Current Account Balance**

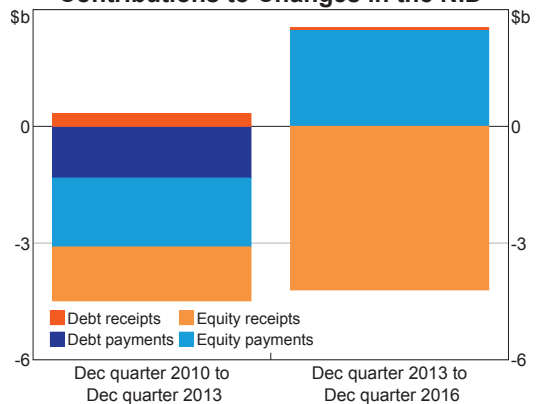
Per cent of nominal GDP



Sources: ABS; RBA

**Graph 16**

**Contributions to Changes in the NID**

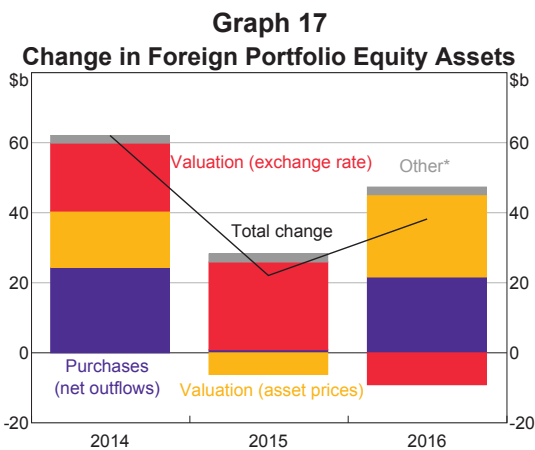


Sources: ABS; RBA

rates and an increase in the share of Australia’s foreign debt owed by the Australian Government (which pays a lower interest rate than private sector borrowers). At the same time, lower profitability of the mining sector led to a decline in payments on equity liabilities. A reduction in the profitability of the mining sector – which is majority foreign owned – gives rise to smaller payments to the foreign owners (either in the form of dividend payments or reinvested earnings) and accordingly reduces the NID.

In contrast, the narrowing in the NID since 2013 has been a result of an increase in the income

received on Australia’s foreign equity holdings (Graph 16). This increase in income is because of the continued flows into offshore equity by Australian superannuation funds and the depreciation of the exchange rate over this period (which increases the Australian dollar value of dividend receipts) (Graph 17).



This is illustrated by the rise in the stock of foreign portfolio equity holdings by Australian residents. These holdings increased by around \$120 billion between the December quarter 2013 and the December quarter 2016. A little less than half of this increase owed to net purchases of portfolio equity. The remainder was due equally to price changes and the depreciation of the exchange rate over the period. Australian Prudential Regulation Authority data allow us to map this increase to the superannuation industry. These data indicate that the value of international listed equity held by the superannuation industry increased by almost the same amount as the stock of portfolio equity recorded over the same period in the balance of payments (that is, around \$120 billion) suggesting that most of the increase in the stock of portfolio equity was due to the superannuation industry.

In the second half of 2016 and into 2017 the NID has widened, partly in response to the recent boost to mining sector profitability from the recent increase in commodity prices (which has been partly unwound and which is not expected to persist). It appears that some of these profits were paid out to foreign owners as dividends, based on company announcements. In contrast with previous periods of high profitability this temporary boost to profitability is not likely to be used to fund further investment.

## Conclusion

To a large extent, trends in capital flows have been broadly unchanged over the past decade following substantial shifts in foreign investment to fund the mining investment boom and in the wake of the financial crisis. But, underlying this, there have been some notable changes in the composition of flows in recent years. First, although mining capital inflows have continued, much of the recent inflows have been (actual) transfers from offshore, as opposed to the (notional) flows associated with reinvested earnings during the mining investment boom. Second, foreign investors have continued to increase their holdings of Australian government debt, but more active management has implications for the measurement of these holdings. And third, although there has continued to be little net capital flows either to or from the banking sector, regulatory reforms have resulted in changes in the composition of short-term debt funding in recent years. Continued net capital inflows have led to a moderate rise in Australia’s net foreign liability position as a share of GDP. Nevertheless, the cost of servicing the net liability position has declined to historically low levels. In recent years, this has been because of an increase in income received from the ongoing investment in offshore equity

by superannuation funds as well as valuation effects, which have boosted the stock of offshore equity holdings. ✎

## References

- Arsov I, B Shanahan and T Williams (2013)**, 'Funding the Australian Resources Investment Boom', *RBA Bulletin*, March, pp 51–61.
- Atkin T and B Cheung (2017)**, 'How Have Australian Banks Responded to Tighter Capital and Liquidity Requirements?', *RBA Bulletin*, June, pp 41–50.
- Baba N, F Packer and T Nagano (2008)**, 'The Spillover of Money Market Turbulence to FX Swap and Cross-currency Swap Markets', *BIS Quarterly Review*, March pp 73–86.
- Becker C, A Fang and JC Wang (2016)**, 'Developments in the Australian Repo Market', *RBA Bulletin*, September, pp 41–46.
- Belkar R, L Cockerell and C Kent (2007)**, 'Current Account Deficits: The Australian Debate', RBA Research Discussion Paper No 2007–02.
- Bergmann M (2016)**, 'The Rise in Dividend Payments', *RBA Bulletin*, March, pp 47–56.
- Bishop J and N Cassidy (2012)**, 'Trends in National Saving and Investment', *RBA Bulletin*, March, pp 9–18.
- Debelle G (2014)**, 'Capital Flows and the Australian Dollar', Speech to the Financial Services Institute of Australia, Adelaide, 20 May.
- Debelle G (2017)**, 'Recent Trends in Australian Capital Flows', Speech to the *Australian Financial Review* Banking and Wealth Summit, Sydney, 6 April.
- Foster R (1996)**, 'Australian Economic Statistics 1949–50 to 1994–95', Reserve Bank of Australia Occasional Paper 8.
- Lougheed A (1987)**, 'International Transactions and Foreign Commerce', in W Vamplew (ed), *Australians: Historical Statistics*, Fairfax, Syme & Weldon Associates, pp 183–209.
- Ma S (2014)**, 'Why Has the Net Income Deficit Narrowed?', *RBA Bulletin*, June, pp 19–26.
- Stewart C, B Robertson and A Heath (2013)**, 'Trends in the Funding and Lending Behaviour of Australian Banks', RBA Research Discussion Paper No 2013–15.



# Banking Fees in Australia

Rachael Fitzpatrick and Graham White\*

The Reserve Bank has conducted an annual survey on bank fees since 1997. The most recent survey suggests that banks' aggregate fee income increased at a relatively slow pace in 2016. Deposit and loan fee income continued to decline relative to the value of products on which these fees are levied. Greater use of electronic payment methods continued to support moderate growth in credit card and merchant service fee income.

## Overview

The Reserve Bank's annual bank fee survey provides information on the fees earned by banks through their Australian operations.<sup>1</sup> The focus of the survey is on fee income generated through the provision of loans, deposit services and payment services. The 2016 survey included 16 institutions, capturing 90 per cent of the Australian banking sector by balance sheet size.<sup>2</sup> Fees earned from operations outside of Australia and other fee income obtained through

assets management and insurance operations are excluded from this survey. This article summarises the results from the latest survey, covering banks' financial years ending in 2016.<sup>3</sup>

In 2016, domestic banking fee income from households and businesses grew at a relatively slow pace of 1.7 per cent, to around \$12.7 billion (Table 1; Graph 1). Deposit and loan fee income relative to the outstanding value of products on which these fees are levied was slightly lower than in the previous year.

**Table 1: Banks' Fee Income**

	Households		Businesses		Total	
	Level \$ million	Growth Per cent	Level \$ million	Growth Per cent	Level \$ million	Growth Per cent
2013	4 127	1.6	7 595	3.1	11 711	2.5
2014	4 169	1.0	7 862	3.5	12 031	2.7
2015	4 341	4.1	8 140	3.5	12 481	3.7
2016	4 408	1.5	8 291	1.9	12 699	1.7

Source: RBA

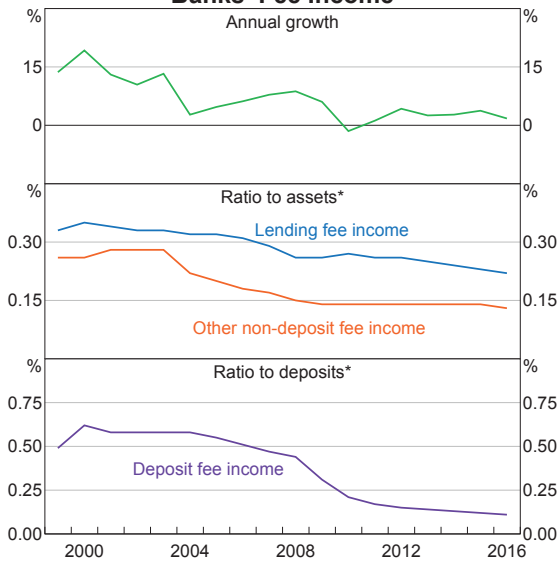
\* The authors are from Domestic Markets Department.

1 The data from the survey are published in the Reserve Bank's statistical table, 'C9 Domestic Banking Fee Income', and are subject to revision on the advice of the participating banks.

2 Survey results have been affected by mergers and acquisitions among participating institutions and some changes in participants' methodology (where possible, this has been reflected in revisions to data reported in previous years).

3 Apart from Table 3, all data from the survey are based on individual banks' financial years, which differ across banks.

**Graph 1**  
**Banks' Fee Income**

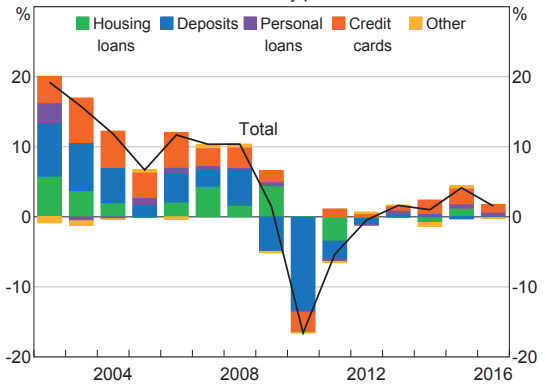


\* Adjusted for breaks in series in 2002 due to a change in banks' reporting; financial-year average assets and deposits have been used  
Sources: APRA; RBA

## Households

Banks' fee income from households grew by 1.5 per cent in 2016. This represented a slowing in growth from the previous year, reflecting lower growth in fee income from housing lending and credit cards (Graph 2; Table 2). Growth in fee income from personal lending reflected

**Graph 2**  
**Growth in Household Fee Income**  
Contribution by product



Source: RBA

the inclusion of a loan portfolio previously not reported in the survey; excluding these new assets, fee income from this segment declined.

Growth in fee income from credit cards slowed in 2016 to slightly below the average since 2010, but remains the largest component of fee income from households. The growth in fees was supported by continued take-up of credit cards bundled with home loan packages. There were also more instances of fees being charged, with some banks no longer waiving fees for transferring a credit card balance to a new card provider. Higher unit fees also contributed to

**Table 2: Banks' Fee Income from Households**

	2014	2015	2016	Annual growth 2016	Average annual growth 2010–15
	\$ million	\$ million	\$ million	Per cent	Per cent
Loans:	2 967	3 139	3 203	2.1	1.1
– Housing	1 182	1 234	1 239	0.4	–2.2
– Personal	366	391	415	6.1	2.5
– Credit cards	1 419	1 513	1 562	3.2	4.0
Deposits	1 122	1 109	1 104	–0.5	1.1
Other fees <sup>(a)</sup>	80	93	89	–4.9	–0.2
Total	4 169	4 341	4 408	1.5	0.1

(a) Includes banking-related fee income from households that cannot be directly related to an individual deposit or loan account (e.g. travellers' cheques or foreign exchange fees)

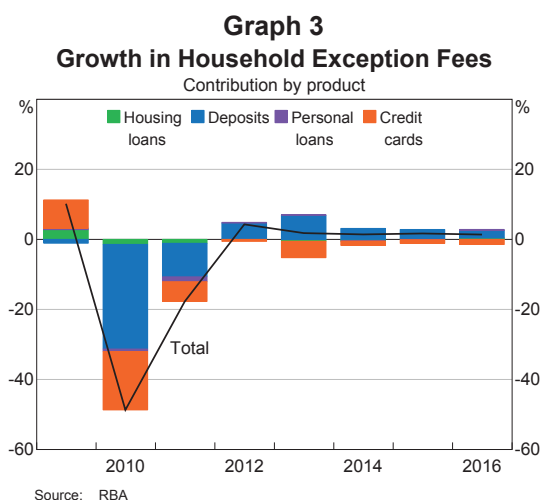
Source: RBA

growth, with some banks increasing annual fees on rewards cards (Table 3).

Income from exception fees charged to households on credit card products continued to decline in 2016 (Graph 3). Despite some increases in unit fees for late payments (Table 3), the decline in exception fee income occurred because customers exceeded their credit limits or made late repayments less often. This trend was broad based across banks.

Fee income from housing loans increased only slightly, consistent with slower growth in loan approvals over the year. Banks continued to report that waivers or reductions in establishment fees were being offered. This more than offset a modest increase in exception fees, particularly those relating to the early termination of a fixed interest-rate period and dishonour fees.

Fee income from deposits declined slightly over 2016, following similarly small declines in recent years. The decline in deposit fee income in 2016 was broad based across most types of fees on deposit accounts, consistent with continued competition between banks for households' deposits. Banks reported that the decline in fee income was due to more fee waivers, reduced



ATM charges owing to customers' increased use of contactless payments technology and EFTPOS cash-out options, and reduced balance enquiries arising from increased use of mobile banking applications. Banks reported that customers are continuing to shift away from traditional savings products, such as stand-alone accounts, to online savings products linked to transaction accounts which attract fewer fees. However, this was partially offset by an increase in income from more frequent occurrences of exception fees on transaction accounts, particularly dishonour fees.

**Table 3: Unit Fees on Credit Cards<sup>(a)</sup>**

	2014	2015	2016	Annual growth 2016 Per cent
Annual fees (\$)				
Non-rewards cards	51	53	53	0.0
Rewards cards	186	185	191	3.3
All cards	134	133	137	3.3
Other fees				
Foreign currency conversion fees (per cent of value)	2.9	2.9	2.8	-1.0
Late payment fee (\$)	19	17	18	2.3

(a) Simple average fees for cards issued by a sample of seven banks; only cards that are available to new cardholders are included in the sample; note that changes in the sample affect the average fee; as at June of each year

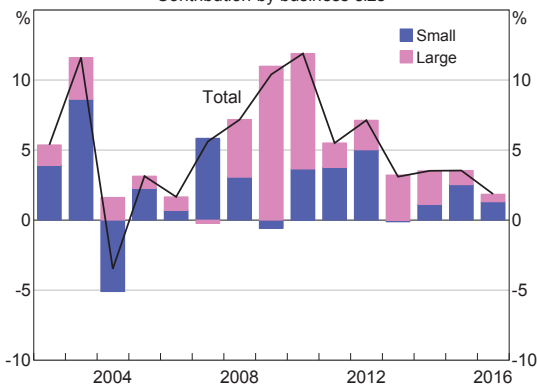
Sources: Credit card issuers' websites; RBA



## Businesses

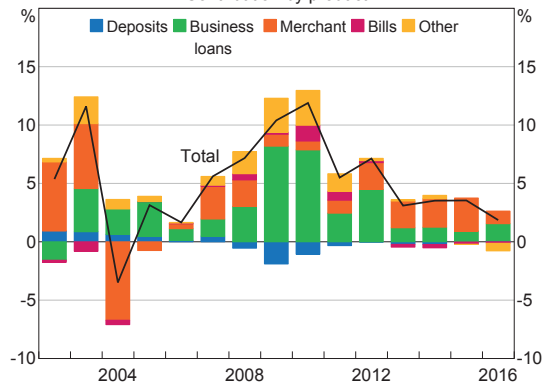
Total fee income from businesses increased by 1.9 per cent in 2016, around the slowest pace for a decade (Graph 4; Table 4). Slower growth was recorded for fee income from both small and large businesses. By product, growth in fee income was driven by increases in business loan fees and merchant service fee income from processing card transactions. Fee income from deposit accounts also increased slightly, while fee income from bank bills and other sources declined (Graph 5).

**Graph 4**  
Growth in Business Fee Income  
Contribution by business size



Source: RBA

**Graph 5**  
Growth in Business Fee Income  
Contribution by product



Source: RBA

The increase in business loan fees mainly reflected higher reported fee income from small businesses. However, changes to banks' reporting methodology accounted for around half of this increase; abstracting from these changes, small business fee income growth was modest. Fee income from loans to large businesses decreased slightly overall, driven by the major banks, who reported that this reflected competitive pressures and reduced new lending activity.

**Table 4: Banks' Fee Income from Businesses**

	2014	2015	2016	Annual growth 2016	Average annual growth 2010–15
	\$ million	\$ million	\$ million	Per cent	Per cent
Deposit accounts	589	587	595	1.3	-1.9
– of which: exception fees <sup>(a)</sup>	41	41	60	na	-7.4
Loans	3 362	3 433	3 552	3.5	4.8
– of which: exception fees <sup>(a)</sup>	42	42	53	na	-4.1
Merchant service fees	2 427	2 651	2 739	3.3	7.6
Bank bills	204	190	179	-5.6	0.7
Other <sup>(b)</sup>	1 280	1 279	1 226	-4.1	2.4
Total	7 862	8 140	8 291	1.9	4.5
– of which: exception fees <sup>(a)</sup>	83	83	113	na	-5.8

(a) Exception fees in 2016 are impacted by a reporting methodology change

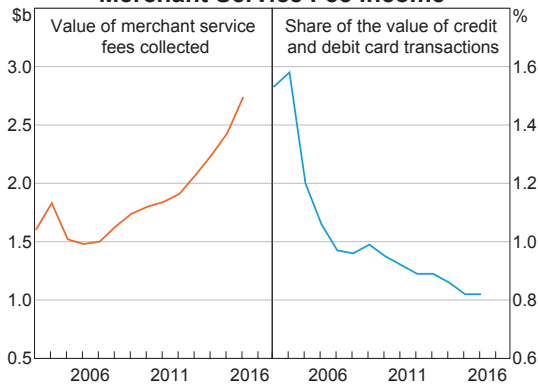
(b) Includes banking-related fee income from businesses that cannot be directly related to a deposit or loan account, merchant or bank bill facility (e.g. guarantees or foreign exchange fees)

Source: RBA

Growth in merchant service fee income was mainly attributable to increased transaction volumes, particularly for credit cards due to wider acceptance of contactless payments. Increased use of platinum and business credit cards, which attract higher interchange fees, also contributed to growth in merchant service fee income from small businesses. Nevertheless, growth in merchant service fee income was evenly spread across small and large businesses. The ratio of merchant service fee income to credit and debit card transactions was stable during 2016 after declining for much of the past decade (Graph 6).

**Graph 6**

**Merchant Service Fee Income**



Source: RBA

Bank bill fee income declined over 2016, partly offsetting the growth in merchant service fee and loan fee income. This reflected a broad shift away from the use of bank bills amid encouragement from banks for customers to use alternative products.

Fee income from business deposits increased slightly, with most of the growth resulting from increased collection of account servicing fees from large businesses. Growth in deposit fee income from small businesses, which accounts for the majority of business deposit fee income, remained subdued. This was due mainly to lower deposit transaction volumes, although some banks also reported reduced unit fees.

Business loan and deposit exception fees increased during 2016, but this was driven by changes in reporting methodologies. Abstracting from this factor, exception fees were little changed.

## Conclusion

Over the past five years, growth in banks' aggregate fee income has been relatively low and stable. Fee income from businesses has grown at a modest pace over this period, while fee income from households has been little changed. By product, this trend primarily reflects relatively flat aggregate deposit fee income and slow growth in aggregate loan fee income. This has offset faster growth in credit card and merchant service fee income, driven by increased transaction volumes as use of electronic payment methods has expanded. ↗



# How Have Australian Banks Responded to Tighter Capital and Liquidity Requirements?

Tim Atkin and Belinda Cheung\*

Australian banks have responded to tighter regulatory requirements for capital and liquidity over the past decade, which has strengthened their resilience to adverse shocks. While banks are now in a much better position to deal with these types of shocks, this strengthening has also had implications for their funding costs and some key profitability metrics. This article outlines some of the main changes to banks' activities as they have responded to the tighter capital and liquidity requirements.

## Introduction

Since the financial crisis in 2008–09, regulatory authorities, financial institutions and financial markets globally have increasingly focused on risk and resilience in the banking sector. Banks assume a range of risks through their lending activities. These include liquidity risk arising from maturity transformation – borrowing short and lending long – and credit risk from their lending activities. Banks can build resilience against these risks by managing their capital and liquidity positions.

The financial crisis highlighted that banks in many countries had not always managed the risks associated with their activities appropriately. In response, the Basel Committee on Banking Supervision revised its international framework of regulatory standards in order to improve the resilience of the global financial system. The revised framework increased capital requirements and introduced minimum liquidity standards. As a result, the framework shifted from focusing mostly on the risk-weighted capital ratio to also considering a range of other risk measures

and management policies.<sup>1</sup> Some of the main changes to the international framework were to:

- increase the amount and quality of capital (including through capital buffers and cyclical macroprudential capital tools, such as the countercyclical capital buffer)<sup>2</sup>
- introduce a non-risk-weighted leverage ratio, a simple and transparent measure of risk
- introduce a liquidity coverage ratio (LCR), which provides a buffer against short-term liquidity stress by requiring a greater amount of high-quality liquid assets (HQLA) to be held
- introduce a net stable funding ratio (NSFR), which promotes resilience to more sustained liquidity pressures by encouraging banks to fund assets with stable sources of funding.<sup>3</sup>

In addition to these global changes, the 2014 Financial System Inquiry made a number of recommendations to strengthen the Australian financial system. These included that capital

---

\* The authors are from Financial Stability Department and Domestic Markets Department.

1 See Edey (2011) for an overview of the changes to the Basel III framework.

2 For more detailed information on capital reforms and their implementation in Australia, see RBA (2013).

3 For more detailed information on liquidity reforms and their implementation in Australia, see RBA (2015).

standards be set so that Australian banks' capital ratios are 'unquestionably strong', and that the average risk weight on Australian mortgages calculated using the internal ratings-based (IRB) approach to credit risk be increased, so that they are closer to the risk weights set under the standardised approach.

In response, the Australian Prudential Regulation Authority (APRA) has implemented several changes to its capital and liquidity requirements. These include introducing the LCR requirement in 2015, establishing additional capital buffers (including a countercyclical capital buffer policy), and implementing a higher minimum average mortgage-risk weight for banks using the IRB approach, which came into effect from mid 2016. In addition, IRB banks are required to disclose their non-risk-weighted leverage ratios while the standards are finalised, and new requirements for the NSFR will become binding from 2018. APRA has indicated that it will publish its view shortly on how 'unquestionably strong' can be measured. Furthermore, APRA, supported by the other agencies of the Council of Financial Regulators, has intensified its supervision of the sector since the financial crisis and introduced new measures to address emerging risks in areas not already captured by the regulatory framework. The remainder of this article outlines some of the main changes to the activities of Australian banks as they have adapted to these changes in capital and liquidity requirements.

## The Strengthening of Australian Banks' Capital Position

A bank's capital provides it with the ability to absorb losses, making it a core part of their resilience against adverse shocks. Capital is more expensive than other types of funding because investors require additional compensation since it bears losses first. As a result, banks have an

incentive to optimise the amount of capital on their balance sheets. The amount of capital held by a bank is most commonly measured as a ratio to its risk-weighted assets.

Australian banks have substantially increased their capital ratios since the financial crisis. The total capital ratio of the Australian banking system has risen by 3¾ percentage points since the start of 2008, and currently stands at 14¼ per cent (Graph 1). The quality of banks' capital has also improved. In particular, Common Equity Tier 1 (CET1) capital – the highest quality form of capital – has accounted for most of the rise in total capital since it was introduced as a minimum requirement in 2013.<sup>4</sup> The combined CET1 capital ratio of the major Australian banks appears to have also strengthened relative to international banks more recently, and it is estimated to now be in the top quartile of the global distribution. Overall, Australian banks have a substantial buffer above APRA's minimum regulatory capital requirements.<sup>5</sup>

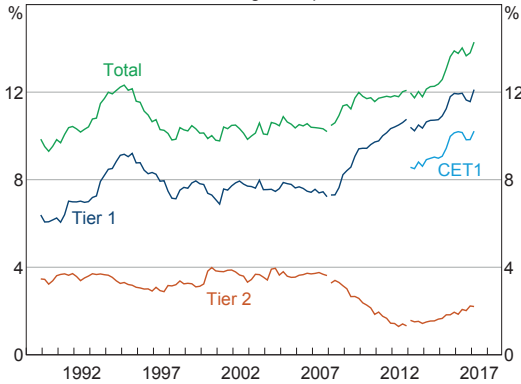
Banks have used a range of methods to increase their capital base. These have included the accumulation of retained earnings, dividend reinvestment plans (DRPs) and new equity issuance – with broadly similar amounts raised through each of these methods since 2008 (Graph 2).<sup>6</sup> Since the financial crisis, there has been a fairly steady increase in retained earnings and equity from DRPs, while new equity issuance was mainly used immediately after the financial crisis and then again in the second half of 2015. Retained earnings have contributed a small

4 Australian banks' total regulatory capital consists of Tier 1 and Tier 2 capital. Within Tier 1 capital, banks are required to maintain a minimum amount of CET1 capital with the remainder able to be made up of Additional Tier 1 capital.

5 Banks are required to maintain a minimum total capital ratio of 8.0 per cent, a Tier 1 capital ratio of 6.0 per cent and a CET1 capital ratio of 4.5 per cent. Banks must also maintain a minimum 2.5 per cent capital conservation buffer of CET1 capital (plus an additional 1 per cent for the four domestic systemically important banks).

6 DRPs are where shareholders reinvest their dividends in return for an increased equity holding.

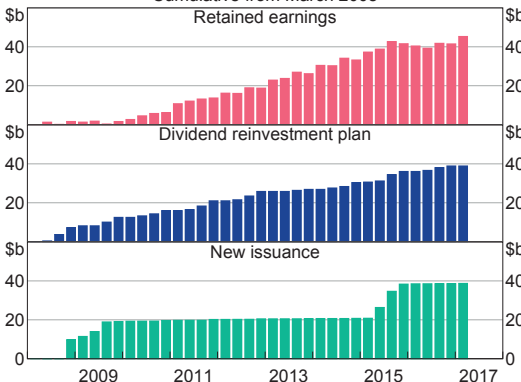
**Graph 1**  
**Banks' Capital Ratios\***  
Consolidated global operations



\* Per cent of risk-weighted assets; break in March 2008 due to the introduction of Basel II; break in March 2013 due to the introduction of Basel III

Source: APRA

**Graph 2**  
**Major Banks' Equity Raisings**  
Cumulative from March 2008

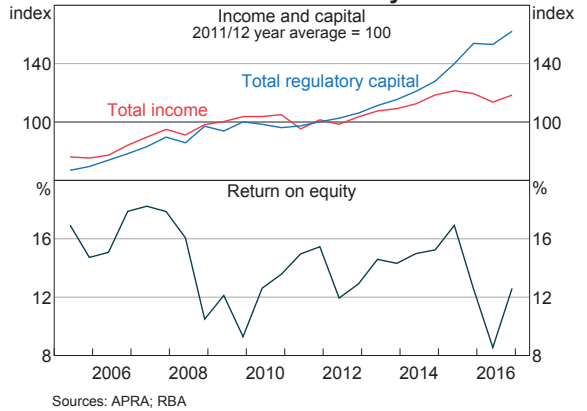


Sources: APRA; ASX; RBA

amount to capital over the past two years as profits have been little changed.

This increase in capital has had a direct effect on banks' return on equity (ROE). Australian banks' ROE remains high by international standards, but the rise in bank capital since 2008, combined with lower profit growth, has reduced ROE to below its pre-crisis levels (Graph 3). While this increase in capital has reduced banks' leverage and should make them more resilient, this does not appear to have been reflected in a lower

**Graph 3**  
**Banks' Profitability**



Sources: APRA; RBA

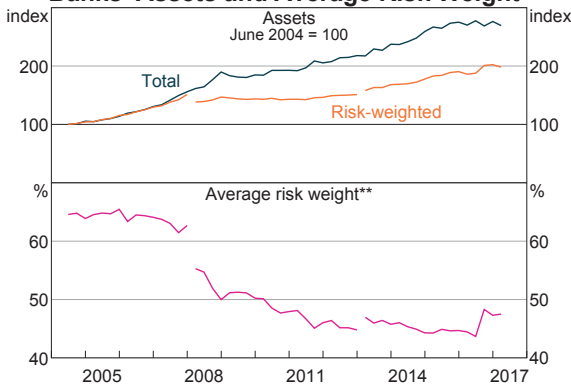
implied risk premium demanded by investors (Norman 2017). As a result, banks' price-to-book ratios have also declined. Looking ahead, ROE will probably remain below its historical levels as banks accumulate more capital to meet previously announced future requirements. In acknowledgement of these developments, some banks have either moved away from or lowered their explicit ROE targets.

Banks have responded to the higher capital requirements by adjusting their lending activities. In particular, they have increasingly focused on activities that generate higher returns for a given amount of capital to help support ROE. Consistent with this, banks have limited the required increase in capital as they have grown their balance sheets over the past 10 years by reducing the average risk weight of their assets (Graph 4). (This is despite a recent rise in the average risk weight associated with APRA increasing the capital requirement for Australian mortgages under the IRB approach.) Overall, the decline in the average risk weight of Australian banks' assets has had the effect of supporting capital ratios to meet higher capital requirements while lessening the effect on ROE.<sup>7</sup>

<sup>7</sup> While the decline in the average risk weight has been mostly driven by changes in the composition of lending, regulatory changes have also contributed, including the introduction of Basel II.

**Graph 4**

**Banks' Assets and Average Risk Weight\***



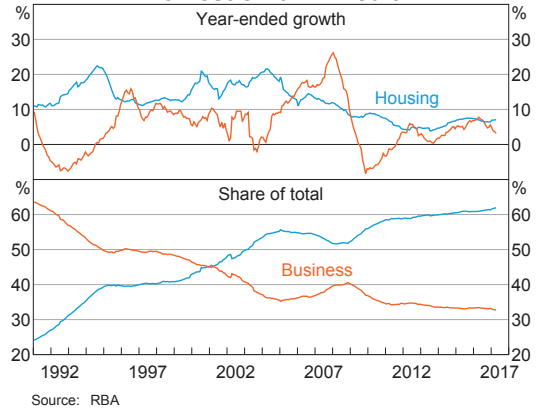
\* Excludes foreign branches; break in March 2008 due to the introduction of Basel II; break in March 2013 due to the introduction of Basel III

\*\* Risk-weighted assets as a share of total assets  
Sources: APRA; RBA

One of the most notable ways that banks have been able to reduce their average risk weight, and the effect of higher capital on ROE, has been through a continued shift towards housing lending. In 2016, housing credit accounted for almost two-thirds of the stock of banks' domestic credit, up from a bit above half in 2008 and well above the level from a couple of decades ago (Graph 5). This long-run trend has been underpinned by factors such as financial deregulation and competition in lending markets, a permanent decline in inflation and an increase in the cost of housing relative to business assets over time; more recently, low interest rates appear to have encouraged housing investment and demand for housing credit, while businesses have been reluctant to invest. Nonetheless, one reason that banks have accommodated the strong demand for housing credit may have been that housing lending has been able to generate higher ROE than other types of lending, because the lower risk weight

**Graph 5**

**Domestic Bank Credit**



applied to mortgages has not been fully offset by narrower credit spreads.<sup>8</sup>

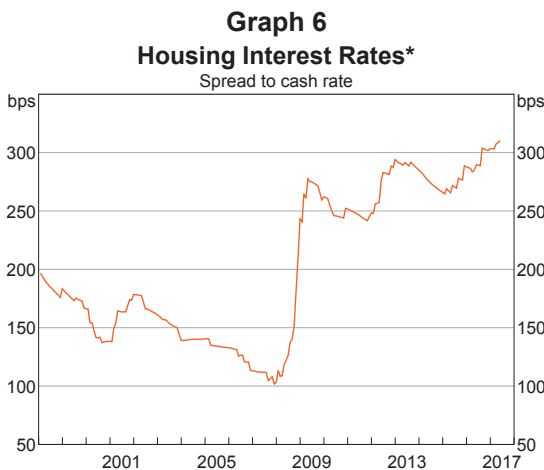
Some banks have also been scaling back lending activities that are more capital intensive but do not generate sufficient returns (for the amount of capital required). This has included some international activities (outside of New Zealand), institutional lending and trade finance exposures. Most notably, NAB sold its UK subsidiary in early 2016 and ANZ and others have been progressively reducing their exposures to institutional lending and trade finance activities. Most of the major banks have also sold (or are in the process of selling) parts of their wealth management businesses. As discussed in Golat (2016), the income generated by these businesses has often fallen short of initial expectations and they have generated lower returns than core banking activities.

Banks have also responded to higher capital requirements by repricing their loans, most notably housing loans. Since mid 2008, the cash rate has declined by 575 basis points while

<sup>8</sup> The average risk weight applied to housing exposures at the major banks (estimated using internal models) is roughly half that applied to corporate exposures, even after accounting for APRA's recent increase to mortgage risk weights. The difference in risk weights reflects lower loss rates for housing exposures compared with corporate exposures.

housing lending rates have declined by around 390 basis points (Graph 6). While part of the widening in this spread has been due to a rise in banks' funding costs relative to the cash rate, the implied spread between banks' mortgage lending rates and their funding costs has still increased by around 110 basis points. Part of this increase in spreads reflects efforts by banks to offset the costs associated with using more equity to fund lending as capital requirements have increased. The remainder likely reflects banks' efforts to offset the impact on their earnings from new regulations requiring them to hold a greater amount of HQLA, which typically have a yield that is less than the cost of funding (as discussed below). More recently, banks have increased their lending rates on investor and interest-only loans, relative to those on amortising owner-occupier loans, in response to regulatory measures regarding these types of loans.<sup>9</sup>

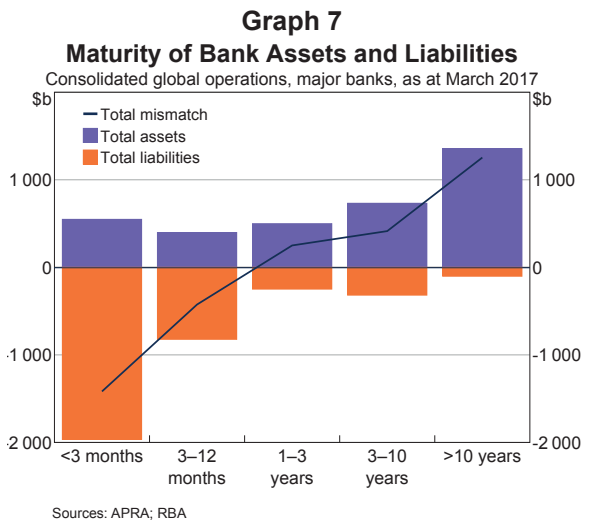
risk by engaging in maturity transformation. Banks generally write long-term loans while banks' creditors generally lend to banks for shorter periods of time. As a result, the average maturity of a bank's assets is much longer than the average maturity of its liabilities (Graph 7). This means banks are exposed to the risk that they will need to repay some liabilities ahead of their assets maturing. Banks earn income from taking on this risk – it accounts for part of the spread between the interest rates on their assets and liabilities. However, the financial crisis highlighted that many banks internationally had not adequately protected themselves against liquidity shocks, such as disruptions in funding markets.



\* Weighted average outstanding interest rates on housing lending  
Sources: ABS; APRA; Perpetual; RBA

### The Strengthening of Australian Banks' Liquidity Position

A second important component of resilience is banks' ability to withstand a withdrawal of funding. As noted earlier, banks assume liquidity



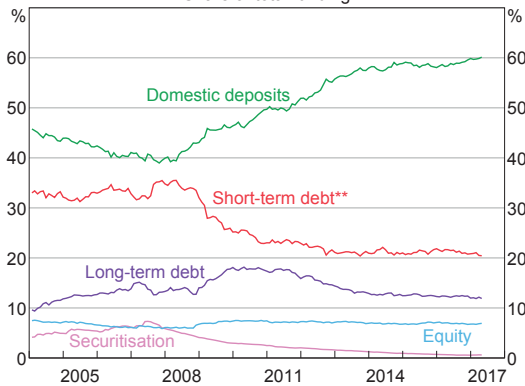
Regulators responded to these lessons from the crisis by introducing new prudential liquidity requirements. These requirements are designed to ensure that banks meet minimum standards regarding the amount of liquidity risk that they can assume and that they hold stronger buffers in case of liquidity shocks (DeBelle 2015). These prudential requirements, and a reassessment of banks' liquidity positions more broadly, have seen Australian banks increase their funding from more stable sources such as deposits, equity and

<sup>9</sup> See RBA (2017, p17) for more information on regulatory measures to reinforce sound housing lending practices.



long-term wholesale debt, while sourcing a lower share of funding from short-term wholesale markets and securitisation (Graph 8).

**Graph 8**  
**Funding Composition of Banks in Australia\***  
 Share of total funding



\* Adjusted for movements in foreign exchange rates; tenor of debt is estimated on a residual maturity basis  
 \*\* Includes deposits and intragroup funding from non-residents  
 Sources: APRA; RBA; Standard & Poor's

Two new liquidity requirements introduced since the crisis are the LCR and the NSFR.<sup>10</sup> The LCR was implemented in Australia in 2015, but banks began adjusting to this change well ahead of this date. It requires banks to hold a buffer of HQLA to cover net cash outflows in a 30-day stress scenario. Since its introduction in 2015, the average LCR across banks that are subject to the requirement has increased from around 120 per cent to around 130 per cent.

The NSFR, which comes into effect in Australia in 2018, requires banks to hold a minimum level of stable funding against their assets and off-balance sheet activities. Stable funding includes equity, long-term debt and sticky deposits such as those from retail customers or small to medium-sized enterprises who have a number of different products with the same bank. The intention is to ensure that banks do not take on an excessive amount of liquidity

risk over a one-year horizon. Banks have been preparing for the introduction of the NSFR over the past year or so, primarily through changes to their liability structure, and most have reported that they are already compliant.

These regulatory changes have caused banks to make adjustments to their liability structures, asset holdings and liability pricing. Each of these is discussed in turn.

### Changes to bank liabilities

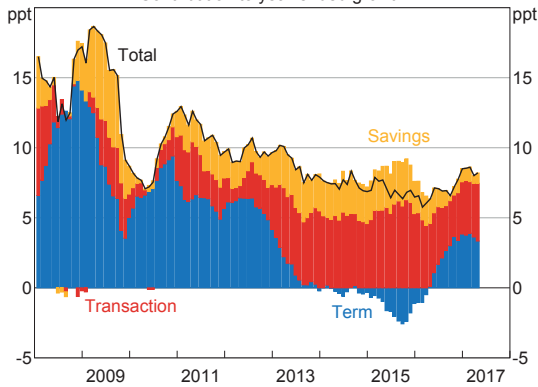
Banks have responded to liquidity requirements by substituting between different types of liabilities, and towards liabilities with longer maturities. Changes to banks' mix of liabilities can have a large effect on the amount of liquidity risk they assume. For example, short-term wholesale debt is generally a less stable form of funding and replacing it with longer-dated funding strengthens banks' liquidity positions. Similarly, increasing the share of equity funding strengthens banks' liquidity positions, since equity is a permanent form of funding. Under the LCR and NSFR, the counterparty from whom funding is sourced is also relevant to how stable that funding is considered to be.

Banks have lengthened the maturity of their liabilities by seeking a greater amount of term deposit funding over the past year (Graph 9). These types of deposits have a longer maturity, which means they are more stable and are less likely to be withdrawn than at-call deposits. Further, banks have increased the average maturity of their term deposit funding, particularly through the second half of 2016.

Banks have also changed the contractual nature of some deposit products to ensure that they cannot be broken within 31 days of maturity (except in hardship cases). These changes were made around late 2014 and were motivated by the impending introduction of the LCR.

10 These prudential requirements apply only to banks that are larger and more complex with respect to their liquidity risk. Other authorised deposit-taking institutions (ADIs) must ensure that their liquid assets are equivalent to at least 9 per cent of their liabilities.

**Graph 9**  
**Australian Dollar Deposits\***  
 Contribution to year-ended growth



\* Break adjusted; not seasonally adjusted; excludes foreign currency, intragroup deposits and certificates of deposit

Sources: APRA; RBA

Moreover, banks have lengthened the average maturity of their wholesale funding by increasing the share of long-term wholesale debt at the expense of short-term wholesale debt (Cheung 2017). In addition, they have increased the average maturity of new issuance of both short-term and long-term wholesale debt. Over the past year, the average term of long-term wholesale debt issuance was around one year longer than its historical average. Similarly, banks have lengthened the average maturity of their short-term debt by issuing securities with longer terms and buying back these securities as they approach maturity. Wholesale debt issuance with short maturities is a relatively unattractive source of funding for banks since they have to hold low-yielding HQLA against this funding. Reflecting this, issuance of bank bills with a one-month maturity has largely ceased, after previously accounting for up to one-quarter of the market.

Another way that banks have responded to changes in liquidity requirements is by sourcing less funding from customers such as large corporations and financial institutions. In general, at-call wholesale deposits are viewed as a less stable form of funding than at-call

retail deposits, which are more likely to be fully supported by the government guarantee under the Financial Claims Scheme (that protects deposits up to \$250 000 for each account holder at each authorised deposit-taking institutions (ADI)). Banks have also changed the contractual terms of at-call wholesale deposits to effectively increase the maturity of these products. For instance, many deposits from large corporates and financial institutions can only be withdrawn after a period of notice has been provided, typically in excess of 30 days.<sup>11</sup>

Another distinction between different at-call deposits is made on the basis of whether the deposit is used for transactional or savings purposes. Transactional (or operational) deposits are considered more stable since they are used by the depositor to make and receive payments, and a minimum balance is typically maintained to support these payments. Bank demand for these comparatively more stable deposits has increased relative to less stable at-call saving deposits that are more sensitive to changes in interest rates (given the sole purpose of these funds is to generate a return for the customer).

### Changes to bank assets

While much of the adjustment to the amount of liquidity risk that banks assume has come through changes to banks' liabilities, banks have also made some adjustments to their assets. The main change to asset composition prompted by the new liquidity regulations has been an increase in holdings of HQLA that can be used as a buffer against liquidity shocks.

The LCR requires banks to hold sufficient HQLA to fund their expected net cash outflows through a 30-day period of stress. Consequently, banks have increased their holdings of HQLA as a share

<sup>11</sup> Similar deposit offerings with notice periods have been extended to retail depositors, although they only account for less than 5 per cent of at-call deposit funding.

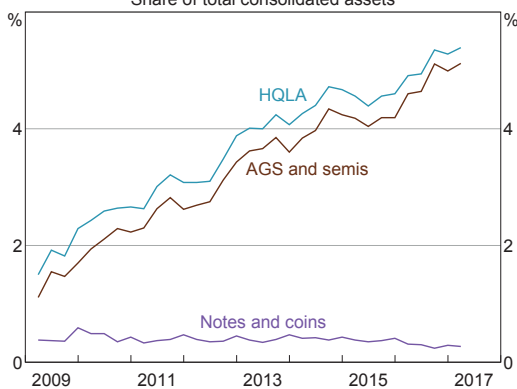
of their assets. Australian dollar-denominated HQLA securities are now about 5 per cent of banks' total assets, up from around 1 per cent in early 2008 (Graph 10). Securities eligible as HQLA include Australian Government Securities (AGS) and state government securities (semis). Because of the relatively small pool of government paper that could be used as HQLA, Australian banks subject to the LCR meet around half of their Australian dollar HQLA requirements via the Committed Liquidity Facility (CLF). The CLF is a contractual, secured liquidity facility offered by the Reserve Bank which, for a fee of 15 basis points per annum (regardless of whether it is drawn), covers any shortfall between the ADI's holdings of HQLA and the LCR requirement. The presence of this facility has ensured the LCR does not create excessive demand for AGS and semis and has limited banks' need to increase their HQLA holdings more substantially. In past years, as outstanding government debt has increased and net cash outflows have generally declined, the size of the CLF has been reduced.

effects attributable to the liquidity value of these products are difficult to disentangle from other price movements. The change in banks' funding mix towards more stable funding sources has, by itself, increased the cost of funding, which has been passed on to many borrowers.

Relative price changes across banks' deposit offerings have been extensive over the past few years, particularly since the introduction of the LCR, as different deposits have a different liquidity value to the bank. Most notably, banks have increased the interest rates on term deposits relative to other deposits and wholesale funding rates, both immediately after the financial crisis and again in preparation for the impending introduction of the NSFR (Graph 11). Interest rates on online saver accounts – where customers get rewarded for making regular deposits – have also risen in response to their regulatory treatment. Banks have also competed for transactional (or operational) banking relationships through improved service levels, product bundling and fees. For example, a product offering that has recently been popular with customers has been a home loan bundled with an offset account and a credit card, with the funds in the offset account considered to be stable deposits.

Changes in bank demand for different sources of funding have also influenced the interest rates on some wholesale debt instruments. The switch in bank demand from wholesale funding with a maturity of less than 30 days to wholesale funding with a maturity of 90 or 180 days has contributed to a widening in the interest rate spreads on these longer-dated bills since 2014 (Graph 12). In contrast, increased bond issuance by banks (which are price takers in offshore markets, where a significant share of the wholesale debt of Australian banks is issued) has been absorbed without price impact, supported by favourable market conditions and the depth of those markets.

**Graph 10**  
**Australian Banks' High-quality Liquid Assets\***  
 Share of total consolidated assets

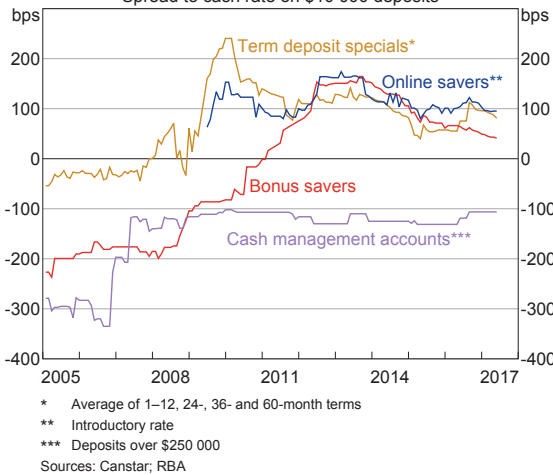


\* Australian dollar HQLA  
 Sources: APRA; RBA

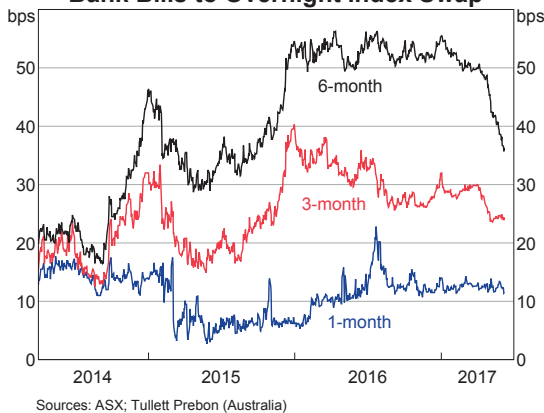
**Pricing changes**

The changes in banks' demand for different assets and liabilities have also affected the interest rates on these products, though the direct

**Graph 11**  
**Major Banks' Deposit Rates**  
 Spread to cash rate on \$10 000 deposits



**Graph 12**  
**Bank Bills to Overnight Index Swap**



The new liquidity standards also require banks to demonstrate an internal liquidity transfer pricing model, which fully reflects the liquidity cost in the price of various products they offer customers. This has resulted in a change in the price (or terms) of a number of lending facilities, such as lines of credit and the cost of offering longer-term business loans. For instance, an increase in the typical maturity of a class of loan over time, such as a mortgage, will result in it

being assigned a higher liquidity cost. Looking ahead, further changes in the relative prices of liabilities and assets are likely as banks continue to assess the liquidity value of their different assets and liabilities. For example, if retail depositors can more easily switch bank accounts over time, then these deposits might attract lower interest rates as they would be a less stable funding source to a bank.

### Conclusion

Stronger capital and liquidity positions improve banks' resilience against adverse shocks. However, such changes can also affect their funding costs and key profitability metrics. Australian banks have responded to increased capital requirements by strengthening their capital position, primarily through an increase in common equity. This has contributed to a decline in ROE, which has encouraged banks to make some changes to their lending activities. These changes have included a continued shift towards housing lending, a scaling-back of capital-intensive and lower-return lending, and a repricing of loans. Banks have also strengthened their liquidity position in response to tighter liquidity requirements and a more general reassessment of risk. This has contributed to a repricing of deposit liabilities, a lengthening of the maturity of liabilities more generally and a continued shift towards more stable sources of funding. Liquidity regulations have also driven a shift in asset composition towards government securities. While the upcoming introduction of the NSFR and 'unquestionably strong' capital framework is likely to have already had some effect on banks' activities, it is likely there will be further adjustments from banks as they fully respond to the revised capital and liquidity requirements. ✖

## References

**Cheung B (2017)**, 'Developments in Banks' Funding Costs and Lending Rates', *RBA Bulletin*, March, pp 45–50.

**Debelle G (2015)**, 'Some Effects of the New Liquidity Regime', Speech at the 28th Australasian Finance and Banking Conference, Sydney, 16 December.

**Edey M (2011)**, 'Basel III and Beyond', Speech at the Basel III Conference 2011, Sydney, 24 March.

**Golat T (2016)**, 'Banks' Wealth Management Activities in Australia', *RBA Bulletin*, September, pp 53–59.

**Norman D (2017)**, 'Returns on Equity, Cost of Equity and the Implications for Banks', *RBA Bulletin*, March, pp 51–58.

**RBA (Reserve Bank of Australia) (2013)**, 'Box B: The Basel III Capital Reforms in Australia', *Financial Stability Review*, September, pp 36–38.

**RBA (2015)**, 'Box A: The Basel III Liquidity Reforms in Australia', *Financial Stability Review*, March, pp 32–34.

**RBA (2017)**, *Financial Stability Review*, April.

# The Australian Exchange-traded Funds Market

Michelle Cunningham\*

Assets under management in the Australian exchange-traded funds (ETF) market have more than tripled over the past four years to around \$25 billion. ETFs enable investors to gain exposure to a wide range of assets at relatively low cost. Australian ETFs have generally replicated their investment benchmarks closely and deviations have tended to be small and temporary. However, there are some potential risks associated with investing in ETFs.

## Introduction

The Australian ETF market has increased rapidly in recent years to around \$25 billion, alongside strong growth in international ETF markets. Globally, assets under management (AUM) for exchange-traded products increased by over 80 per cent over the past four years and totalled around \$5 trillion at the end of 2016, with the United States accounting for over 70 per cent of global AUM.<sup>1</sup>

In light of this rapid growth, this article looks at developments in the Australian ETF market. It covers the different types of ETFs listed on the Australian Securities Exchange (ASX), which types of ETFs have experienced the strongest growth and who invests in ETFs. It also examines how ETFs perform relative to their benchmarks, and concludes with a brief review of some of the risks that ETFs present and how these are managed.

## What Is an ETF?

ETFs are investment funds that are traded on an exchange and typically track a specified benchmark

index.<sup>2</sup> Most commonly these benchmark indices are equity indices, while fixed-income, currency and commodity indices account for a smaller share of ETFs' AUM. ETFs enable investors to gain exposure to a diversified range of assets at relatively low cost. Furthermore, they also enable retail investors to invest in asset classes that in the past were generally only accessible to wholesale or institutional investors (for example, fixed-income products and emerging market equities).

Units in an ETF are created by an entity known as an 'ETF issuer'. Among other responsibilities, ETF issuers create ETF units by issuing them in exchange for the underlying basket of assets (usually equity securities). However, the ETF issuer can only transact with an entity called an 'authorised participant' (AP), who is authorised by the ASX and has an agreement with the ETF issuer.

Another important class of participant in this market is the 'market makers'. In Australia, ETFs are required to have one primary market maker. These market makers are obliged to show quotes for buying and selling units that fall within a narrow range around the value of the ETF's underlying basket of assets, or net asset value (NAV).

\* This article was written when the author was in Domestic Markets Department.

1 Australian ETF figures used here exclude exchange-traded *managed* funds, which account for around \$2 billion in AUM; however, the global total figures include a broader range of exchange-traded securities such as exchange-traded managed funds.

2 For further detail on the mechanics of ETFs, see Kosev and Williams (2011).

The ASX offers a market-making incentive scheme for other market-making participants to maintain prices and liquidity. Market makers receive incentives (equivalent to trading fees) when benchmarks for the quoted price and minimum trading volumes are achieved. Market makers, therefore, play a key role in keeping the ETF's price closely aligned to its NAV.

The creation (or redemption) of ETF units is usually initiated by market makers based on the size of their inventory of ETF units. If the market maker's inventory is low, as one possible response they can instruct the AP to create additional units. To create ETF units, the AP will transfer the basket of assets underlying the ETF to the ETF issuer, although the equivalent cash amount can also be transferred in some cases. The ETF issuer then creates the ETF units, which the market maker will acquire via the AP. Redemptions of ETF units follow the opposite process, again initiated by the market maker.

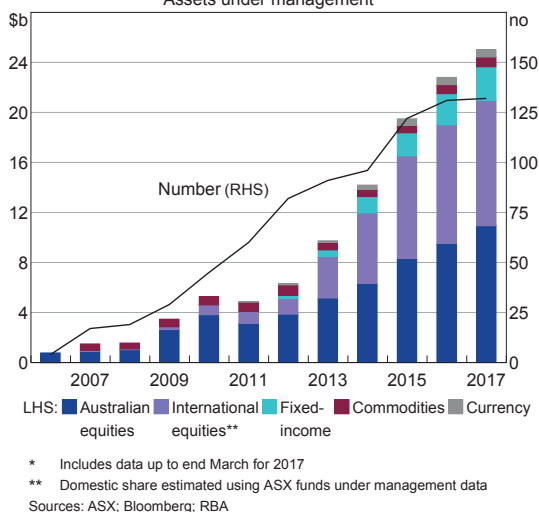
Market makers wish to avoid maintaining inventories that are too low. If inventories are too low, then the market maker may need to frequently approach an AP to create more units, incurring a fixed cost each time, or adopt other expensive strategies. On the other hand, maintaining ETF inventories that are too high generates market risk and/or hedging costs for the market maker.

If the market is functioning well there would be limited opportunity for arbitrage for the market makers. Arbitrage could occur, for example, if there were demand for an ETF at a price above its NAV. In that case, a market maker or AP could create units and offer them on the market at that higher price, and pocket the difference. However, other market makers could also come in and arbitrage that difference away. Industry liaison suggests that these opportunities are limited in the Australian market, and that the incentives faced by market makers keep prices closely aligned.

## The Structure of the ETF Market in Australia

Australian ETF assets under management have more than tripled since 2012, to be around \$25 billion at the end of March 2017 (Graph 1). There has been a corresponding increase in the number of ETFs, with 132 ETFs listed on the ASX. However, the ETF market in Australia is still relatively small compared with other major markets. In Australia, ETFs account for around 1½ per cent of the local stock market capitalisation compared with about 5 per cent in Canada and Europe, and around 10 per cent in the United States. The Australian ETF market is also more concentrated in equity ETFs than other developed economy markets, with fixed-income ETFs accounting for a relatively small share.

**Graph 1**  
**Australian Listed ETFs\***  
 Assets under management



ETF turnover in Australia has recently averaged around \$60 million per day, equivalent to about 1 per cent of total ASX turnover. However, ETF trading activity can be volatile, peaking at up to 4 per cent of ASX turnover on days when there are sizeable creations and redemptions of existing ETFs or new ETF listings; notwithstanding the higher trading activity, creations or redemptions

usually have little or no impact on the ETF price and its underlying securities. Turnover can also vary by the type of ETF: the majority of large equity ETFs trade daily, while some of the smaller funds trade less frequently. In comparison, ETF turnover in the US totals around \$100 billion per day and accounts for around one-third of all trading in US stocks. The most heavily traded ETF in the US is State Street's S&P 500 ETF, which has an average daily trading value of around \$20 billion.

ETFs listed on the ASX fall into six broad categories (Table 1):

- *Domestic equity ETFs* account for the largest share of the ETF market, at 44 per cent, or \$11 billion. Most domestic equity ETFs track a broad-based index, such as the ASX 200 or ASX 50, with the remainder split between sector-focused (resources, financials and property) and strategy ETFs. Traditionally,
- *ETFs tracked indices weighted by market capitalisation* but there has been a rise in strategy or 'smart beta' funds, which use different weighting techniques (rather than market capitalisation weighted indices).
- *International equity ETFs* represent the second largest share of AUM, at almost 40 per cent or \$10 billion.<sup>3</sup> Within this sector, ETFs tracking global equities and US equities account for two-thirds of AUM, with ETFs tracking European, Asian, emerging markets, specific market sectors and strategy benchmarks accounting for the remaining third.
- *Domestic fixed-income and cash ETFs* are quite new, with the first fund listed on the ASX in 2012. This sector now has 12 funds and accounts for around 11 per cent of total AUM. The Australian High Interest Cash ETF accounts for over 40 per cent of total AUM within this

**Table 1: Australian Listed ETFs**  
end March 2017

	Number	AUM (\$b)	Share of total ETF AUM (%)
Domestic equity	37	10.9	44
– Broad based	15	7.6	31
– Strategy	12	1.7	7
– Sector	10	1.6	7
International equities	62	9.8	39
– Global indices	12	3.2	13
– US	11	3.6	15
– Asia, Europe, Emerging Markets	21	1.8	7
– Sector and strategy	18	1.1	4
Domestic fixed-income and cash	12	2.7	11
Global fixed-income	5	0.2	1
Commodity	11	0.8	3
Currency	5	0.6	2
<b>Total</b>	<b>132</b>	<b>25.0</b>	

Sources: ASX; Bloomberg

<sup>3</sup> Around half of international equity ETFs have their primary listing in the United States; for these ETFs, only domestic funds under management are included here, as reported by the ASX. International equity ETFs can be traded during normal ASX trading hours, despite some of the markets that they track being closed.



sector and government-issued bond ETFs account for about 15 per cent. Fixed-income indices generally follow some criteria, such as particular maturities, credit quality or issuer type (such as government or corporate). When bonds in the portfolio mature or are sold, the proceeds are reinvested.

- *Global fixed-income ETFs* were first listed on the ASX in December 2015, and now account for around 1 per cent of total AUM. These cover high-yield developed market bonds, global corporate bonds, emerging market bonds and government-issued bonds.
- *Commodity ETFs* represent around 3 per cent of total AUM, with the majority of funds invested in four physical gold ETFs. There are also three commodity ETFs that are synthetic ETFs, which use derivatives to replicate the return of a particular commodity, and represent less than 10 per cent of AUM within this sector. Although globally synthetic ETFs account for a larger share of the ETF market, in Australia synthetic ETFs are limited to these three commodity ETFs (and account for less than 1 per cent of total AUM).
- *Currency ETFs* account for around 2 per cent of total AUM. Almost all AUM are held in one US dollar ETF, with euro, pound and renminbi ETFs accounting for the remainder.

## ETF Investors

The ETF market in Australia is dominated by investors who have invested through a financial advisor/broker and by self-managed superannuation funds. The composition of investors in Australia differs from the United States, Canada and Europe, where institutional investors account for a larger share of investors while retail investors account for a smaller share. These compositional differences are partly a result of ETFs in North America and Europe being originally

targeted to institutional investors, while ETFs have had more of a retail focus in the Australian market (Vanguard 2016). There are several key aspects of ETFs that make them attractive to investors, particularly retail investors. They provide:

- low management fees
- a cost-effective means of diversifying portfolios using a single product
- access for retail investors to markets that have traditionally only been available to institutional investors
- the ability to trade throughout the day
- transparency of the fund's holdings, as they are generally published daily.

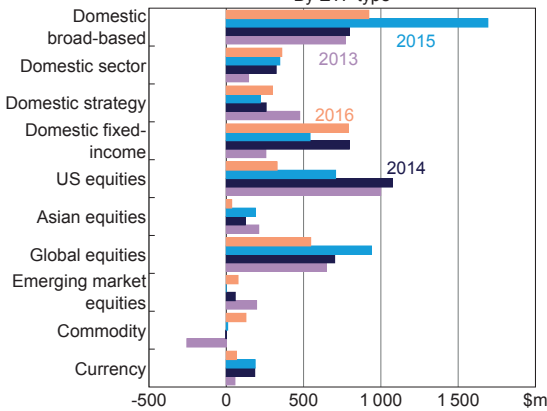
Asset allocation also differs by the type of investor: SMSFs tend to hold more domestic equity ETFs, whereas direct investors tend to hold a greater share of international equities. Meanwhile, institutional investors are more exposed to fixed-income ETFs.

## Change in ETF Assets under Management

The total value of ETF assets under management in Australia has increased by around \$4 billion per year on average since 2013; however, the increase in AUM was slightly lower in 2016. Over 2017 to date, AUM have continued to increase at a solid pace.

Domestic broad-based and global equity ETFs have generally seen the largest dollar increase in AUM in recent years, with domestic broad-based ETF AUM increasing by almost \$1.7 billion in 2015 and \$1 billion in 2016 (Graph 2). Fixed-income ETFs have experienced the strongest percentage growth in AUM of all ETFs since 2014, increasing by around 40 per cent on average. Demand for these assets may have been supported by periods of higher volatility and risk aversion. The change in AUM for other ETFs tends to be more closely related to their relative returns.

**Graph 2**  
**Change in Assets Under Management**  
 By ETF type



Sources: ASX; Bloomberg; RBA

### ETF Tracking Accuracy

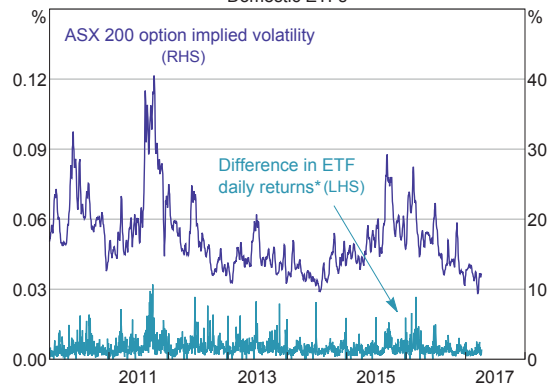
An ETF's performance can be evaluated by the difference between the ETF's returns and the returns on the benchmark that it is tracking, such as the ASX 200 index, FTSE Australia High Dividend Yield index, or Bloomberg AusBond Composite 0+ Yr Index. Over the past year, domestic ETFs underperformed their benchmark by around ½ percentage point on the basis of the *annual* total return. Most of the underperformance can be attributed to fund management fees but there are a number of other factors that can also cause a divergence, such as transaction costs and index licensing costs (for example, funds that track the S&P/ASX 200 have to pay a licence fee to S&P). In addition, the ETF might only hold a representative sample of the index due to costs or difficulties associated with holding some securities (however, this is likely to be more of an issue for some international equity ETFs). Therefore, even if the price of an ETF is closely aligned to its NAV, it could diverge from the value of the benchmark.

Domestic ETFs replicated their benchmarks well on the basis of *daily* returns. The difference in

total daily returns tends to vary by the size and type of the ETF: domestic broad-based ETFs tend to record the smallest differences, while strategy ETFs recorded larger differences. Larger divergences between the total daily return of domestic ETFs and their benchmarks often corresponded with heightened market volatility (Graph 3). However, in most cases, any sizeable divergences were generally unwound the following day with a similar sized movement in the opposite direction.

Some of the daily return difference can be attributed to timing differences. In particular, some ETFs are lightly traded, so a significant amount of time can elapse between the last ETF trade of the day and the end of the day, when the benchmark returns are calculated. The market can move in that elapsed time. Industry liaison suggests this issue is significant for some funds.

**Graph 3**  
**Difference in Daily Returns**  
 Domestic ETFs



\* Median absolute daily total return difference between the ETF and its benchmark

Sources: ASX; Bloomberg; RBA

### Risks

Alongside the strong growth in the ETF market, a number of concerns and potential risks have been raised by market participants and regulators. These concerns have generally focused on: liquidity risk; counterparty and

collateral risks that are typically associated with synthetic ETFs; as well as the complexity of alternative ETF structures.

- Liquidity in the ETF market could decrease in times of market stress, particularly if market makers and/or APs withdrew from the market.
- Synthetic ETFs rely on a counterparty paying the return of the ETF without holding the benchmark, so there is some risk that the counterparty could default or not be able to pay the return (if they have not sufficiently replicated the return of the benchmark).
- As the ETF market continues to expand, there has been a rise in the number of ETFs with more complex structures, such as leveraged and inverse ETFs, as well as ETFs that use more obscure benchmarks.<sup>4</sup> Some investors may not fully appreciate the risks of investing in these instruments.

There are some features of the Australian market which help to moderate these risks. For example, the ASX offers an incentive scheme to market makers to maintain liquidity, and the majority of Australian ETFs track traditional benchmarks.

Also, synthetic ETFs, which may be more prone to these risks, have been subject to close scrutiny by regulators. In 2011, the Financial Stability Board (FSB) and the Bank for International Settlements (BIS), raised concerns about ETFs, especially regarding their complexity and transparency (FSB 2011; Ramaswamy 2011). With these concerns in mind the ASX, based on discussions with the Australian Securities and Investments Commission (ASIC), introduced more stringent admission requirements for ETFs than found in other jurisdictions (ASIC 2012). Examples of the

regulations that apply in Australia are restrictions on counterparties to either an Australian deposit taking institution and various collateral restrictions. Synthetic ETFs represent a very small share of ETFs listed on the ASX.

Looking forward, the risks associated with ETFs may increase, especially as the market continues to expand into more novel instruments. ✖

## References

- ASIC (Australian Securities and Investments Commission) (2012)**, 'Regulation of Exchange Traded Funds', Report 282, March.
- FSB (Financial Stability Board) (2011)**, 'Potential Financial Stability Issues Arising from Recent Trends in Exchange-Traded Funds (ETFs)', April.
- Kosev M and T Williams (2011)**, 'Exchange-Traded Funds', *RBA Bulletin*, March, pp 51–60.
- Ramaswamy S (2011)**, 'Market Structures and Systemic Risks of Exchange-Traded Funds', BIS Working Papers 343.
- Vanguard (2016)**, 'ETF use Matures for Australian Investors', 18 May. Available at <<https://www.vanguardinvestments.com.au/au/portal/articles/insights/pressroom/ETF-use-matures-for-Australian-investors.jsp>>.

<sup>4</sup> A leveraged ETF uses debt and/or derivatives to create a fund that has a higher volatility than the benchmark, but is correlated with it. An inverse ETF uses derivatives that deliver returns that go in the opposite direction of the benchmark.

# The Ongoing Decline of the Cheque System

Ed Tellez\*

Cheque use in Australia has declined significantly over the past few decades and currently represents only a small share of non-cash payments. This decline reflects changes in the payments market as a result of technological change and customer preferences for faster, digital payments. To ensure that the payment needs of individuals and businesses continue to be met, the payments industry has embarked on a number of initiatives to manage the decline in cheque use.

## Introduction

Cheques were the most important non-cash payment method in Australia a few decades ago.<sup>1</sup> In 1980 cheques accounted for 85 per cent of the number of non-cash payments and almost all of their value (Mackrell 1996). The popularity of cheques was partly due to a number of features that consumers valued (see 'Box A: Features of Cheques') and partly due to the absence of alternative payment instruments.

However, with changing consumer preferences, the growth of other instruments such as debit and credit cards, and increasing technological payments innovations such as direct credit payments, the use of cheques has declined significantly over the past few decades. As a result, in 2016 cheques represented about 1 per cent of the number of non-cash payments, and – reflecting the higher average transaction size than for other payment types – about 7 per cent of the value of such payments.

Over 20 years ago, Mackrell noted that cheques were no longer the dominant payment instrument they were in 1980, although they were still popular with the general public. Today, cheques represent a very narrow segment of the payment system and are no longer used by the majority of the general public.

## Cheque Use

Historically, cheques have played a significant role in the Australian payments system. In the mid 1990s there were close to 50 cheque payments per capita each year, more than double the number of debit card payments (Graph 1). Since then, cheque use has steadily declined, with fewer than five cheque payments per capita in 2016. In contrast, transactions using other non-cash payment methods have increased strongly, with Australians making over 200 payments per capita with debit cards and over 100 payments per capita with credit cards in 2016.

Notably, cheque use is not just declining, but declining at an increasing rate. The number of cheques written in recent years has declined significantly faster than at the start of the decade (Graph 2). Indeed, in 2016 cheque use

\* The author is from Payments Policy Department.

<sup>1</sup> This article refers to non-cash retail payments that involve financial institutions. That is, the analysis excludes both transactions using cash (which do not involve a financial institution) and wholesale payments (often related to securities and large corporate transactions) that are settled via real-time gross settlement at the Reserve Bank.

## Box A

# Features of Cheques

Cheques possess a number of attributes that may be valued by end users. They:

- allow physical, face-to-face, simultaneous exchange, for example, for property settlement
- can be written on a 24/7 basis, including at times when banks' systems are not operative or when the payer does not have access to a computer, mobile phone or cash
- allow additional information to accompany the payment, for instance, when an invoice or other documentation is attached to the cheque
- allow payment to be made when only limited information is known about the person to whom payment is being made
- allow significant financial control where, for instance, the need for a specific signature (or multiple signatures) provides key account signatories oversight of all outward payments within a business
- are flexible, they may be transferred to a third party (negotiable) and they may be addressed to 'bearer'.

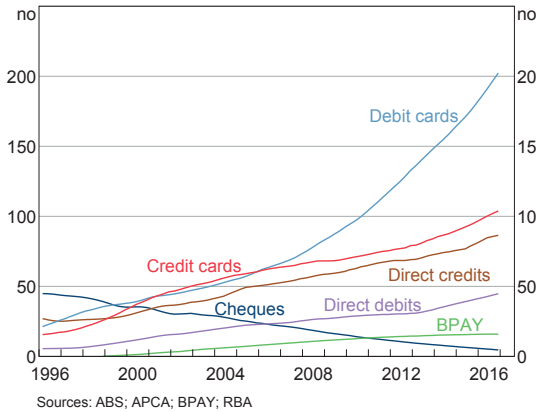
On the other hand, cheques have a number of less desirable attributes:

- cheques (with the exception of financial institution cheques) are typically liabilities of households or businesses and are, therefore, subject to the risk of the drawer having insufficient funds in their account
- recipients typically face significant delays in obtaining cleared funds, especially if the provision of the cheque or its deposit involves the postal service
- as a result, cheques (with the exception of financial institution cheques) are not suited to many transactions where the cheque recipient is providing goods or services that cannot be recovered in the event that the cheque is not honoured
- cheques are costly and becoming increasingly so as their use declines.

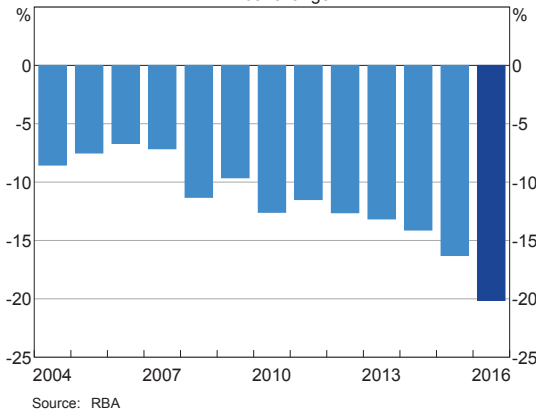
For reporting and analytical purposes cheques are divided into three categories:

- commercial cheques, written by commercial customers (mostly businesses and government entities) of a financial institution that are drawn on that institution, including cheques used to withdraw cash
- personal cheques, written by personal customers of a financial institution that are drawn on that institution
- financial institution cheques (or 'bank cheques'), drawn by an institution on itself or on the issuing institution's own account with the drawee bank.

**Graph 1**  
Non-cash Payments per Capita  
Year to date



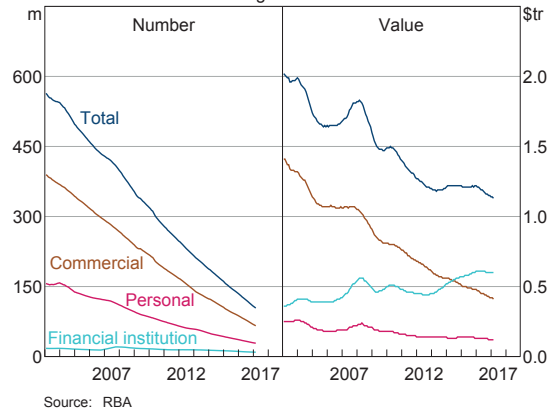
**Graph 2**  
Number of Cheque Payments  
Annual change



experienced the largest percentage decline on record, with the number of cheques written falling by 20 per cent.

The decline in cheque use has been most significant for commercial and personal cheques, with the number of these cheques falling by around 13 per cent per year over the past decade, a cumulative fall of more than three-quarters (Graph 3). The number of financial institution cheques written has also declined, albeit at a slower rate. In contrast, the value of financial institution cheques written has increased over the past decade. As discussed

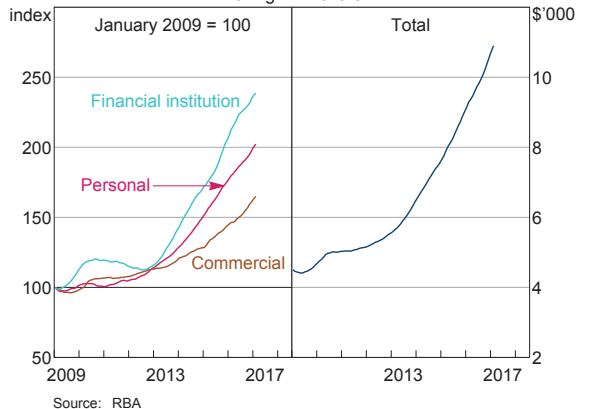
**Graph 3**  
Cheque Payments  
Rolling 12 months



below (see 'Financial Institution Cheques'), this increase is likely to reflect the use of financial institution cheques for certain large-value purchases, particularly of property, for which prices have grown strongly over this period.

While the number of cheques written has fallen, the average value of the remaining cheque payments has risen across all cheque types, particularly over the past five years (Graph 4). This is partly a result of migration of many smaller value payments to electronic methods while cheques continue to be used for larger value payments. Industry liaison indicates that cheques

**Graph 4**  
Average Value of Cheques  
Rolling 12 months



are often used for amounts that exceed the limits on electronic channels and, as noted earlier, for particularly large transactions such as property purchases.

## Commercial Cheques

The decline in commercial cheque use has been a long-term trend. The acceleration in this decline in the past few years has been associated with falls in both the number of bank accounts with cheque facilities and the average number of cheques written on those accounts still with cheque facilities. This partly reflects the increasing use of internet banking by businesses. Lower cheque volumes also reflect the implementation of the SuperStream reforms, which required employers to make superannuation contributions using electronic methods.<sup>2</sup>

Industry liaison indicates that remaining commercial cheque use is concentrated in particular industries, such as real estate and conveyancing, finance and insurance, and business services. For example, some insurance companies use cheques for payment of claims. Industry sources also suggest that small businesses tend to use cheques more than large businesses.

Traditionally, some government agencies have been significant users of cheque payments but this is changing. Federal government agencies have recently taken steps to reduce payments by cheque. For example, the Department of Human Services stopped issuing cheques for welfare payments through Centrelink in January 2016 and for the Medicare rebate and Pharmaceutical

Benefits Scheme refund payments in July 2016 (Department of Human Services 2016).

## Personal Cheques

The aggregate data show a significant fall in the use of cheques by individuals, with the number of personal cheques written falling from 8 per capita in 2002 to just over 1 per capita in 2016. Further information on the use of personal cheques is provided by the Reserve Bank diary studies on consumer payments (the Consumer Payments Survey) conducted every three years since 2007. The 2016 survey found that cheques accounted for about 0.2 per cent of the total number of consumer payments during the week-long diary period, down from 1.2 per cent in 2007 (Doyle *et al* 2017). That is, of around 17 000 consumer payments recorded over the week of the 2016 survey, less than 40 were cheque payments. Consistent with this trend, the share of survey respondents reporting at least one personal cheque payment in the year before the survey fell to 12 per cent from around 20 per cent in 2013.

While the small number of cheque payments in the survey makes it difficult to analyse trends in detail, some broad observations can be made. Respondents to the 2016 survey indicated that the remaining cheque use is largely to pay for larger expenditures such as household bills, holidays or services (Graph 5). However, even in these segments cheques are only a small share of the total number of payments. Reflecting these larger expenditures, the 2016 survey showed a median value for cheque payments of around \$135, compared with a median value of \$22 for all other payments.

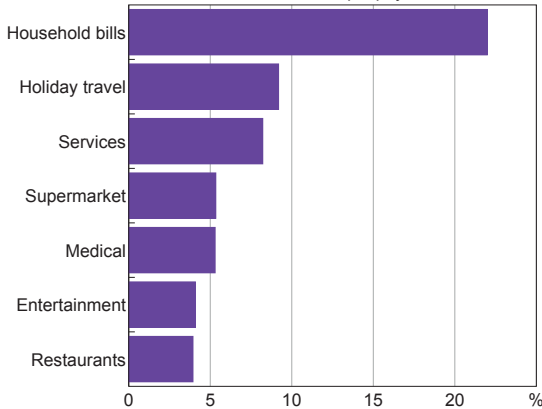
Respondents to the 2016 survey were asked the most important reason for why they used cheques. For those respondents who did use cheques, the most common responses were that some merchants prefer to be paid by cheque, there is

<sup>2</sup> SuperStream is a government reform aimed at improving the efficiency of the superannuation industry, a sector that had traditionally been heavily reliant on cheques. This initiative grew out of the Cooper Review, which identified cheque use as an inefficiency in the superannuation system (Commonwealth of Australia 2010). The Review proposed the establishment of a standardised IT protocol for the electronic processing of superannuation contributions and rollovers between trustees.

**Graph 5**

**Cheque Payment Purpose**

Share of number of cheque payments, 2016\*

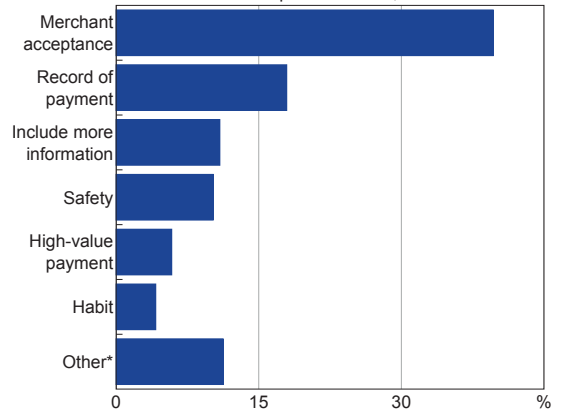


\* Selected purposes  
Sources: Ipsos; RBA

**Graph 6**

**Why Use Cheques?**

Most important reason, 2016



\* Includes low cost, avoiding surcharges, useful for sending by post and other  
Sources: Ipsos; RBA

no alternative for that particular type of payment or because cheques provide a useful record of the payment (Graph 6). Some respondents noted that cheques allow them to include more information with the payment (by attaching documents). Others noted the ‘safety’ provided by cheque payments. This might reflect that – in contrast with cards in some circumstances – writing a cheque creates very little exposure of the payer to fraud. But it might also reflect that cheques allow older or less mobile consumers to make payments for services without having to keep large amounts of cash in their homes.

While only a few cheque users noted that cheques are useful for sending by post, in practice, half of the cheque payments recorded during the week were made by post. This use of cheques for remote payments may partially reflect a limited choice of payment instruments for some respondents. Around half of the respondents who made cheque payments during the week of the survey indicated that they did not hold a credit card and over a third reported they did not use the internet on a regular basis.

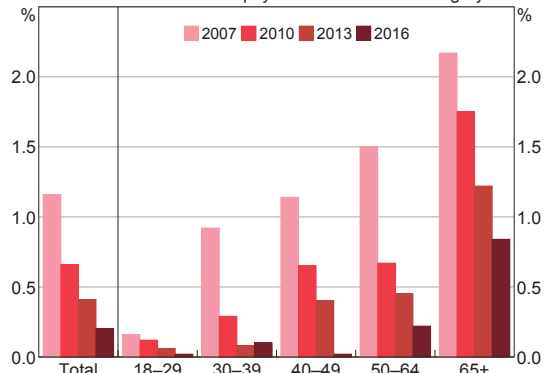
The diary surveys confirm that older consumers are more likely to use cheques (around 70 per cent of cheques recorded in the most recent survey were written by people aged 65 and above). However, they show that the fall in cheque use is occurring across all age groups (Graph 7). In 2007, cheques represented a little over 2 per cent of the number of payments made by consumers over 65 years old; in 2016 this had fallen to less than 1 per cent.

The continued fall in personal cheque use likely reflects greater availability of other payment

**Graph 7**

**Cheque Payments by Age**

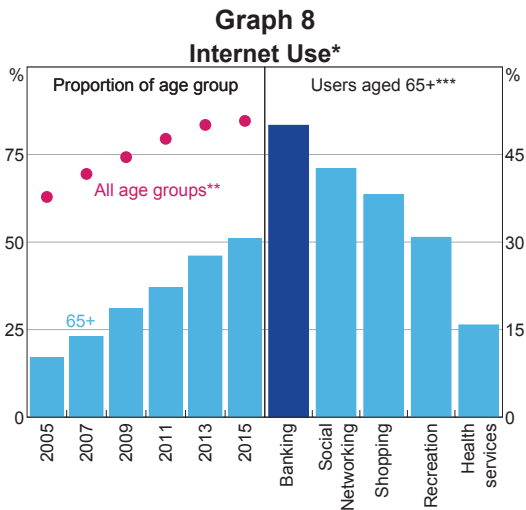
Per cent of number of payments within each category



Sources: Colmar Brunton; Ipsos; RBA; Roy Morgan Research



methods as well as increasing confidence in the use of the internet and electronic payments across consumers in all age groups. Consistent with this, internet use among older Australians is rising rapidly and their largest single use of the internet is for online banking and paying bills (Graph 8).

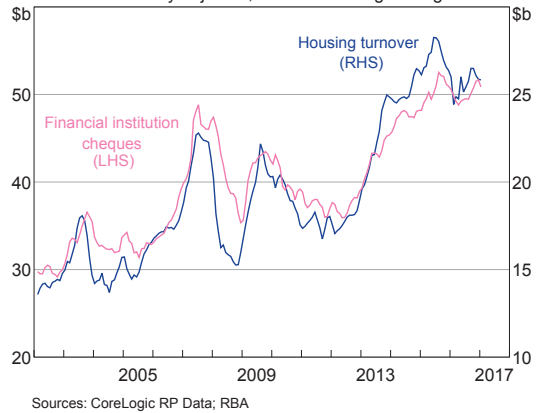


\* Accessed the internet at any site over the year to June  
 \*\* Persons aged 15 years and over  
 \*\*\* Selected reasons for accessing the internet, 2014–15  
 Source: ABS

### Financial Institution Cheques

While financial institution cheques represented only 9 per cent of the number of cheques written in 2016, they accounted for over half of the value of cheques, because of their much larger average value. Industry liaison indicates that the majority of the value of financial institution cheque use is in the settlement of property purchases (and related transactions such as the payment of stamp duty). Accordingly, the issuance of such cheques is correlated with indicators of property market transactions (Graph 9). Nevertheless, the use of cheques for property settlements is likely to fall in coming years as electronic conveyancing becomes more common (see ‘Industry Initiatives’ below). Industry sources also indicate that financial institution cheques are often used for other high-value purchases,

**Graph 9**  
**Cheque Use and Housing Turnover**  
Seasonally adjusted, 3-month moving average

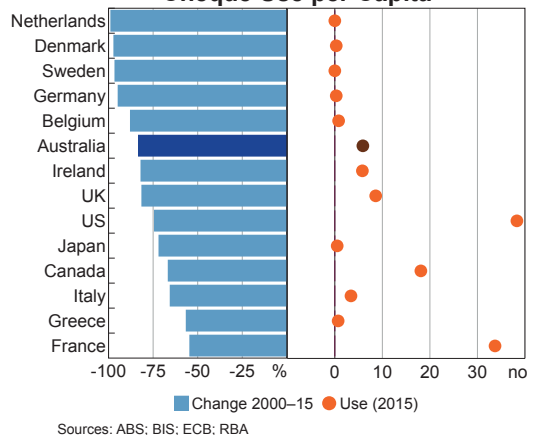


for example, private sales of cars and other second-hand goods; they are also used widely for rental bonds.

### International Perspective

The decline in cheque use in Australia is consistent with global trends. A sample of 14 high-income OECD economies shows that all experienced a fall in per capita cheque use of at least 50 per cent over 2000–15 (Graph 10). Significant declines in cheque use have occurred even in some of the economies that have traditionally had very high cheque use (most

**Graph 10**  
**Cheque Use per Capita**



notably the United States, Canada and France). As a result, many OECD countries now have a very low number of cheque transactions per capita. This includes most countries in Europe (some of which traditionally had low levels of cheque use).<sup>3</sup> Indeed, in at least one case the cheque system has now been closed: due to the decline in the use of cheques and their high processing costs, Dutch banks stopped issuing cheques in July 2001 and terminated processing by the end of that year.

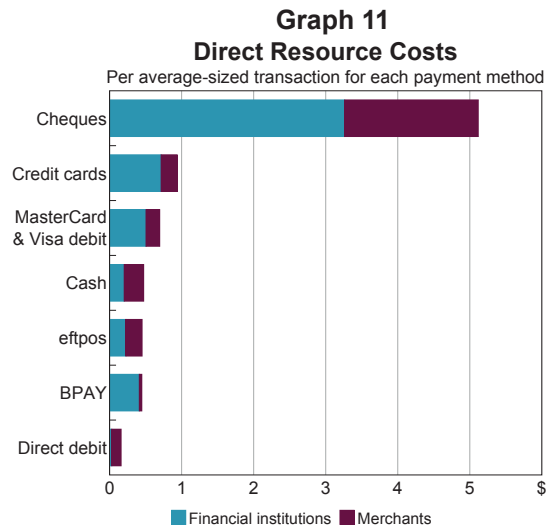
## Cost and Pricing of Cheques

Cheques are a relatively costly payment instrument for financial institutions and many end users. Moreover, even though cheque use is likely to decline further, many of the overheads associated with the cheque system may remain largely unchanged, implying that average unit costs are likely to increase over time. Concerns over the cost of cheques have prompted an industry discussion of how their decline can be managed in an orderly manner (see 'Industry Initiatives' below).

One recent source of information on the cost of cheques is the Reserve Bank's 2014 Payment Cost Study which examined the costs borne by merchants, financial institutions and individuals in the use of different payment methods (Stewart *et al* 2014). Among other things, the study calculated the 'resource costs' of different payment methods – the economic costs incurred by participants to 'produce' payments of each type. While the focus of the study was on consumer-to-business payments, the results should also be relevant to payments between other sectors of the economy.

<sup>3</sup> Some European countries traditionally used direct-entry-style giro systems for making payments. Under this system a customer wishing to make a payment lodges an instruction at their bank, which then passes on the value and payment details to the beneficiary's bank. The credit transfer characteristics of the giro system facilitated the transition to electronic payments in those European countries (Mackrell 1996).

The 2014 study estimated that cheques were the most resource intensive of the commonly used payment methods by a considerable margin, costing over \$5 per transaction (Graph 11). The bulk of these costs was incurred by financial institutions. However, costs to merchants were also higher than for other instruments: for example, in the case of retailers, processing times at the check-out associated with cheque transactions were significantly longer than for other payment methods. Consistent with this, a number of large merchants including Myer and David Jones have stopped accepting cheques for in-store purchases in the past few years.



Financial institutions' pricing policies for cheques vary, based on the type of customer and account. In many cases, accounts allow for cheques to be written or deposited at no charge (though often with a monthly account fee). In those cases where customers are charged, pricing often appears to be below the resource costs suggested by the Bank's cost study.

## Industry Initiatives

The payments industry in Australia has embarked on a number of initiatives to manage the decline of cheque use. These initiatives are aimed at ensuring that the evolving payment needs of individuals and businesses continue to be met at the same time as the cheque system becomes increasingly costly to operate. The Reserve Bank, as a regulator of the payment system, has also contributed to the public discussion of the future of the cheque system.<sup>4</sup>

In 2011, the Australian Payments Network (AusPayNet, formerly known as the Australian Payments Clearing Association, APCA) commenced a public consultation on this issue. Following this consultation, AusPayNet published a report addressing the challenges presented by declining but persistent cheque use and proposing a number of measures to assist current cheque users participate in the digital economy (APCA 2012). More recently, the Australian Payments Council (APC) has highlighted these issues in its Australian Payments Plan (APC 2015).

A particularly important initiative is the New Payments Platform (NPP), scheduled for launch in late 2017. The NPP will provide a new national infrastructure for fast, flexible and data-rich payments (Bolt, Emery and Harrigan 2014). This will enable some of the features of cheques to be better replicated electronically. For example, the NPP's addressing service will facilitate easier addressing of payments, so that payers will no longer need to know Bank State Branch (BSB) and account numbers to make a payment to another individual or entity. And the NPP's message format will allow significantly more data to be transmitted with a payment than the current Direct Entry message, allowing the inclusion of more remittance information. The immediacy of NPP payments will also make them

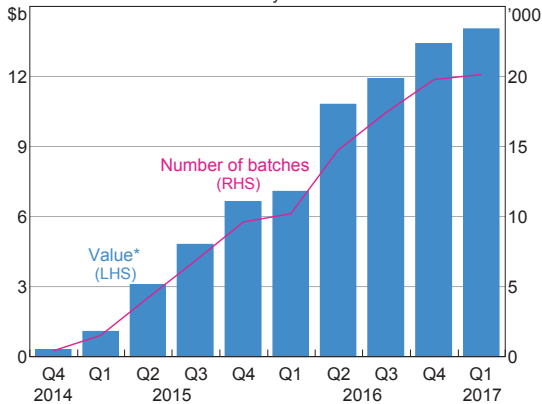
suitable for transactions requiring simultaneous exchange of the payment for goods or services, for example, used car sales. Importantly, the NPP will support various 'overlay' services, which will allow financial institutions to provide tailored services to meet customers' needs. These more specialised services have the potential to address many other situations where users currently feel they have little alternative but to use cheques.

Another important initiative is the shift to electronic conveyancing (e-conveyancing) which allows property settlement and the associated transfer of funds to occur electronically, using real-time gross settlement at the Reserve Bank. This process is being implemented through a joint venture company, Property Exchange Australia (PEXA), owned largely by a number of state governments and financial institutions. While the number of settlements transacted on PEXA is still moderate, and many relate to refinancing rather than property sales, activity has grown rapidly over the past two years. Reserve Bank data show that there were around 20 000 PEXA-related property settlements, including refinancing, in the March quarter 2017 (Graph 12).<sup>5</sup> This compares with about 120 000 sales transactions in the national housing market in the same period. It is likely that a material share of property sales will continue to shift to PEXA, reducing the value of financial institution cheques issued. In particular, four states across Australia have released timelines to transition to online property settlements over the next two years.

<sup>4</sup> For more details see Richards (2016).

<sup>5</sup> More accurately, there were around 20 000 settlement *batches* in the quarter. In the vast majority of cases a settlement batch represents a single property transaction. A batch is a group of interbank credits and debits that are submitted to the Reserve Bank Information and Transfer System for settlement. These payment obligations must sum to \$0 (i.e. the sum of the debits equals the sum of the credits).

**Graph 12**  
**Property Settlement**  
Quarterly flows



\* Total value of multilateral net batches  
Source: RBA

## Conclusion

The number of cheque payments in Australia has declined by around 85 per cent over the past two decades, and cheques currently account for only a small share of non-cash payments. This decline has been driven by market forces amid growing availability of card and electronic payments and consumers' preference for faster payments. Furthermore, the decline has accelerated significantly in recent years. With developments such as the NPP and e-conveyancing, and as access to online payments becomes more common across all Australians, the shift away from cheques is expected to continue. As more customers take up electronic payments, more businesses and other payees are likely to stop accepting cheques.

The decline in the use of cheques has not been accompanied by any significant difficulties from users in making or receiving payments by cheque. Rather, the decline has been quite

orderly and appears to have simply reflected consumers, businesses and government entities switching to other, newer payment methods that better meet their needs. The industry is working on a number of initiatives to address the ongoing decline in cheque use. These initiatives aim to ensure that the payment needs of individuals and businesses continue to be met in an efficient, low-cost manner. ✕

## References

**APC (Australian Payments Council) (2015)**, 'Australian Payments Plan', December.

**APCA (Australian Payments Clearing Association) (2012)**, 'The Decline of Cheques: Building a Bridge to the Digital Economy', Final Report on the APCA public consultation 'The role of cheques in an evolving payments system', May.

**Bolt S, D Emery and P Harrigan (2014)**, 'Fast Retail Payment Systems', RBA *Bulletin*, December, pp 43–51.

**Commonwealth of Australia (2010)**, 'Super System Review: Final Report', June.

**Department of Human Services (2016)**, 'Medicare Patient Cheques Have Stopped', Media Release, 24 June.

**Doyle M-A, C Fisher, E Tellez and A Yadav (2017)**, 'How Australians Pay: New Survey Evidence', RBA *Bulletin*, March, pp 59–65.

**Mackrell NC (1996)**, 'Cheques and the Payments System', RBA *Bulletin*, October, pp 26–31.

**Richards T (2016)**, 'The Ongoing Evolution of the Australian Payments System', Speech at the Payments Innovation 2016 Conference, Sydney, 23 February.

**Stewart C, I Chan, C Ossolinski, D Halperin and P Ryan (2014)**, 'The Evolution of Payment Costs in Australia', RBA Research Discussion Paper No 2014-14.



# Conditions in China's Listed Corporate Sector

Chris Read\*

The financial statements of listed companies provide a detailed insight into the broader conditions faced by businesses in China. Listed firms have deleveraged over the past few years, although declining profitability has reduced their capacity to cover interest payments, especially for state-controlled firms. High leverage and declining profitability in the real estate and construction sectors remain a concern, especially given these sectors have been a key driver of economic growth in recent years.

## Background

The financial health of China's companies has important implications for economic growth and financial stability in China. In particular, high and rising debt, combined with slower economic growth, has sparked concerns about economic and financial risks and spillovers to China's trading partners, including Australia (RBA 2016, p 4). As such, accurately assessing conditions in the corporate sector is very important.

While some official data on corporate financial positions are published, they cover only a limited number of sectors, and are based on surveys of firms above a certain size.<sup>1</sup> Additionally, the aggregate nature of these data precludes firm-level distributional analysis. The detailed quarterly financial statements of listed companies are a useful alternative data source for analysing conditions faced by China's corporate sector and its financial health.

China has two mainland stock exchanges, in Shanghai and Shenzhen. By the end of 2016, around 3 000 non-financial companies were listed on these exchanges, with a combined book value of almost CNY50 trillion in assets.<sup>2</sup> This represents a small, but growing, share of China's broader corporate sector. Listed companies are estimated to have made up just over 5 per cent of non-financial enterprise assets in 2014, while listed company debt was around 10 per cent of the official measure of China's non-financial corporate debt in 2016.<sup>3</sup>

Manufacturing companies are the most common type of listed company, and account for around 40 per cent of total listed company assets (Table 1). Mining companies' share of total listed company assets has declined over the past few years, while

\* The author is from Economic Group

1 China's National Bureau of Statistics (NBS) publishes aggregate data on the balance sheets of industrial (mining, manufacturing and utilities), real estate and construction firms with annual revenue exceeding CNY20 million.

2 Data are sourced from financial statements collated by WIND Information. Companies listed with either 'A' or 'B' shares (B shares are open to foreign investment) on either stock exchange are included, but companies with multiple listings are counted only once. The sample is unmatched, so it includes all companies listed on the exchange at each point in time. Around 100 companies have been delisted since 2000. Roberts and Zurawski (2016) find that the broad features of this dataset are similar if a matched sample is used.

3 Estimates of non-financial enterprise assets are from the Chinese Academy of Social Sciences, while the official measure of debt is the People's Bank of China's total social financing, excluding household loans and equity financing.

**Table 1: Listed Company Assets**  
 Non-financial companies listed on Shanghai and Shenzhen stock exchanges

Industry	Number	2006		2016		
		Total Assets		Number	Total Assets	
		CNY trillion	Share state controlled		CNY trillion	Share state controlled
Manufacturing	767	2.6	79	1 944	18.0	63
Mining	49	0.8	97	75	6.3	96
Services	299	1.2	87	605	7.3	69
Construction	37	0.1	76	90	6.0	92
Real estate	121	0.4	72	129	6.1	67
Other <sup>(a)</sup>	130	0.9	95	142	3.5	92
Total	1 403	6.1	85	2 985	47.3	75

(a) Includes utilities, agriculture and other sectors  
 Sources: RBA; WIND Information

construction and real estate companies' shares have grown strongly. Relative to the broader corporate sector, manufacturing, mining and construction firms appear to be somewhat over-represented in the listed company sample, while real estate firms are under-represented.<sup>4</sup> Services firms are also probably under-represented, given that many services firms are smaller and so are less likely to be listed.

As at the end of 2016, the majority of listed companies were classified as privately owned or controlled firms ('private firms'), and their share had increased over the past several years.<sup>5</sup> Private firms have also increased their share of the total assets of listed companies, but the bulk of listed

company assets remain state owned or state controlled ('state firms'), because these firms are larger on average. Listed private firms are most prevalent in the real estate and manufacturing industries, but are relatively uncommon in the mining, construction and utilities industries.

Because the industry and ownership composition of the listed sector differs from that of the wider corporate sector, aggregate data for the listed sector might not be representative of broader trends in the economy. Listed companies are also likely to be much larger than the average firm, and benefit from greater access to debt and equity financing. Nonetheless, the financial statements provided by listed companies offer an unusually detailed insight into the conditions and risks facing Chinese firms.

### Leverage

A commonly cited concern for China has been the extent to which its economic growth has relied on rapid growth of credit, especially in the corporate sector (IMF 2016). Non-financial corporate debt has increased as a share of GDP from 110 per cent in 2008 to 210 per cent in 2016 (BIS 2017 p 253), increasing the vulnerability of

4 This article uses industry classifications from the China Securities Regulatory Commission. The services industry group is a combination of several service-related industries. Listed companies in the financial industry category (CNY155 trillion in assets at the end of 2016) are excluded from this analysis. Comparisons of industry shares in the wider corporate sector are made using estimates of industry assets from the NBS surveys of industrial, construction and real estate firms.

5 This article identifies state versus private firms using the ownership classification scheme from WIND Information. State companies include those classified as local or central state-owned companies, and public or collective enterprises. All others are classified as privately owned. The ownership classification is not time varying and is based on current ownership. A small number of companies in the sample have changed from state-owned to privately owned, or vice versa, which may result in some small discrepancies in the history of some of the state and private series.

the sector to a negative financial or economic shock. The Chinese authorities have highlighted corporate deleveraging as an important part of the economy's structural reforms (NDRC 2017).

The rise in corporate sector leverage in the aftermath of the 2008–09 stimulus is evident in a range of metrics for listed companies (Graph 1).<sup>6,7</sup> Most of the run-up in leverage occurred among state firms, which have remained more highly leveraged, on average, than private firms. By industry, the increase in leverage was most noticeable in the construction and real estate sectors (Graph 2). The high leverage of firms in these sectors increases the risk of financial distress should conditions in the property market deteriorate.

A number of factors may mitigate the risks posed by this general run-up in leverage. First, the increase in interest-bearing debt has been less than the increase in total liabilities, which reduces the direct interest costs faced by firms.<sup>8</sup> Second, the increase in debt has been partially offset by an increase in holdings of cash and cash equivalents (see 'Liquidity and Payments' below). Finally, over the past few years, listed firms have, on average, begun to deleverage. This has occurred across both state and private firms, and most industries.<sup>9</sup>

The composition of debt held by firms has changed substantially over time, as China's financial system has developed (Graph 3). A much greater

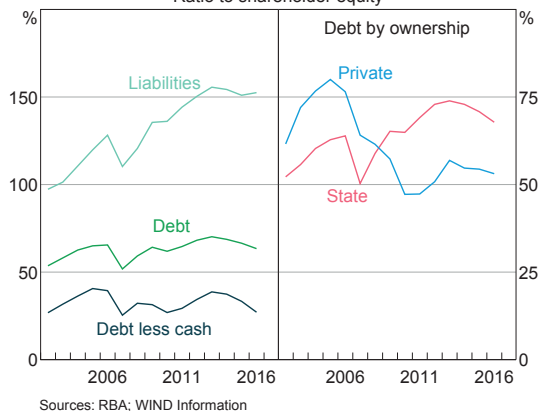
6 The 2008–09 economic stimulus was enacted by the Chinese authorities to minimise the impact of the global financial crisis on the economy.

7 The results in this section are consistent with previous work examining China's corporate leverage using listed company data, including Chivakul and Lam (2015) and Roberts and Zurawski (2016).

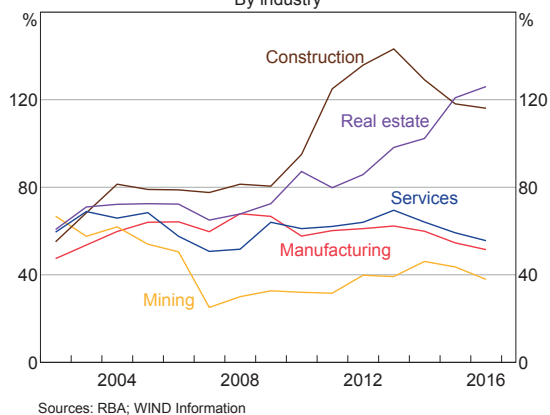
8 Interest-bearing debts are liabilities that require interest payments, i.e. loans and debt securities; other liabilities include accounts payable and funds received in advance.

9 In contrast to the reduction in leverage seen in the listed company data, some broader estimates of corporate debt (e.g. the debt-to-GDP ratio) have continued to increase quickly in recent years. This difference largely reflects the different choice of denominator. Roberts and Zurawski (2016) find that the growth of debt in a matched sample from the same listed company dataset discussed here broadly matches the dynamics of China's official measure of debt.

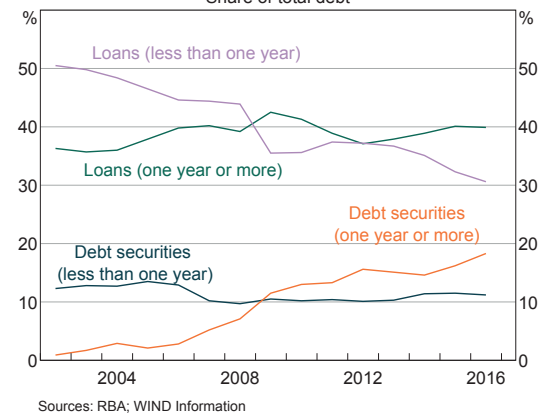
**Graph 1**  
**Listed Company Leverage**  
Ratio to shareholder equity



**Graph 2**  
**Debt-to-Equity Ratio**  
By industry



**Graph 3**  
**Composition of Debt**  
Share of total debt

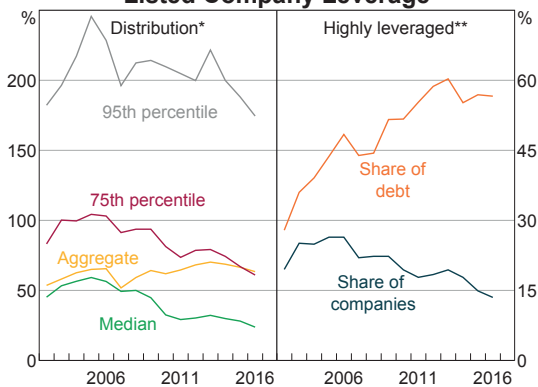




share of debt is now held in the form of debt securities (notes and bonds) with a term of more than one year, providing firms with more stable funding, although some may find it more difficult to roll over debt securities than short-term loans.

While this aggregate assessment of listed corporate leverage suggests some reduced risk in recent years, the distribution of leverage is a cause for concern. The share of companies that are 'highly leveraged' (i.e. hold more interest-bearing debt than equity) has declined over the past decade, but the share of debt held by these highly leveraged firms has increased; these companies now hold half of all listed company debt (Graph 4). The higher concentration of debt among the most leveraged firms suggests that the vulnerability of firms most exposed to a negative shock to their revenue or profits has increased.

**Graph 4**  
**Listed Company Leverage**

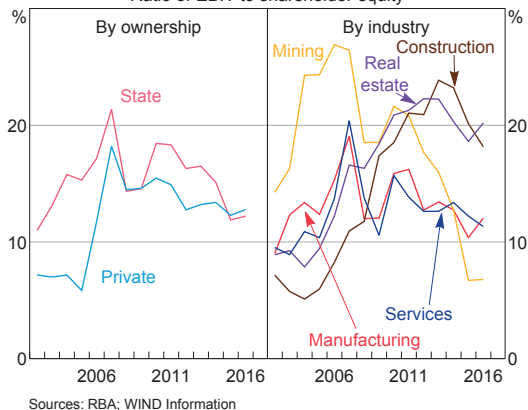


\* Ratio of interest-bearing debt to shareholder equity  
 \*\* Companies that hold more debt than shareholder equity  
 Sources: RBA; WIND Information

## Profitability

Profitability of listed companies has been declining since the 2008–09 stimulus, especially for state-controlled firms and firms in the mining, manufacturing and services sectors (Graph 5).<sup>10</sup>

**Graph 5**  
**Listed Company Profitability**  
Ratio of EBIT to shareholder equity



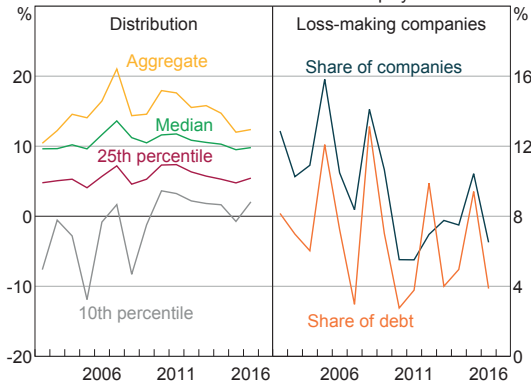
While the profitability of firms in building-related sectors (real estate and construction) rose to relatively high levels in the aftermath of the stimulus, it has declined over the past few years. The higher operating profitability of state firms over much of the sample was largely offset by their higher effective tax rates and interest costs (due to their higher leverage).<sup>11</sup> After interest and tax payments (i.e. net profit, rather than EBIT), private companies were more profitable than state companies in 2015 and 2016, after several years of similar profitability.

The proportion of listed firms that are loss making fell sharply in 2016, after increasing for several years (Graph 6). The share of loss-making firms was higher for state firms than for private firms in 2016, and most common in the mining industry, consistent with its lower average profitability.

<sup>10</sup> The measure of profitability used here is earnings before interest and tax (EBIT) as a ratio to equity. EBIT is a measure of operating profit and ignores variables such as the tax burden or operating structure of firms.

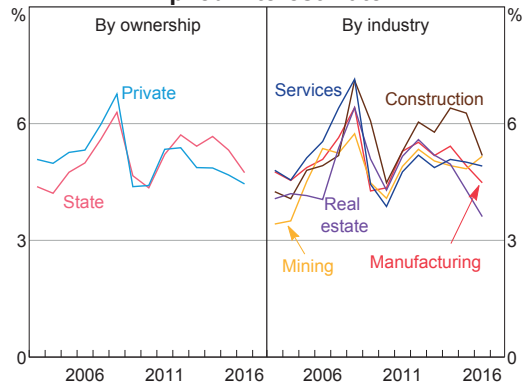
<sup>11</sup> The higher return on equity of state firms over this period also reflects their greater use of leverage. Leverage allows them to increase their profit relative to equity, even if the return on their assets declines.

**Graph 6**  
**Listed Company Profitability**  
Ratio of EBIT to shareholder equity



Sources: RBA; WIND Information

**Graph 7**  
**Implied Interest Rate\***



\* Ratio of annual interest expense to average debt in current and previous year

Sources: RBA; WIND Information

## Interest Servicing

The implied interest rate paid on debt by listed companies has declined over the past few years, consistent with a series of reductions in benchmark lending interest rates by the People's Bank of China and corresponding declines in average lending rates (Graph 7).<sup>12</sup> This has supported firms' profitability (by reducing interest payments for a given amount of debt) and allowed them to increase leverage by more than would otherwise be possible (because servicing debt is easier).

A commonly cited view is that state firms receive loans on better terms from banks (Yi and Liang 2016). This is not directly supported by the listed company data, with state firms having faced higher average implied interest rates than private firms over the past few years, in aggregate and by industry.<sup>13</sup> However, this may be because the interest subsidy that state firms receive is offset by their lower average creditworthiness.

A simple regression of the listed company data suggests that, after controlling for various factors that influence creditworthiness, state firms do face lower (although not significantly different) interest rates relative to private firms.

Despite the decline in implied interest rates and leverage of listed firms over the past few years, falling profitability has resulted in a decline in the interest coverage ratio (how many times annual earnings can pay interest expenses), entirely driven by the state sector (Graph 8).<sup>14</sup> The interest coverage ratios of private firms have been greater than those of their state counterparts in recent years, due to their lower indebtedness. Across industries, changes in interest coverage have been mixed, although all saw an increase in 2016. Construction firms have the lowest level of average interest coverage, while mining company interest coverage has declined in recent years from very high levels.

<sup>12</sup> The implied interest rate is calculated as the current year's interest expense divided by the average of the current and previous year's stock of debt. Accordingly, this reflects the interest paid on all debt, including both loans and debt securities.

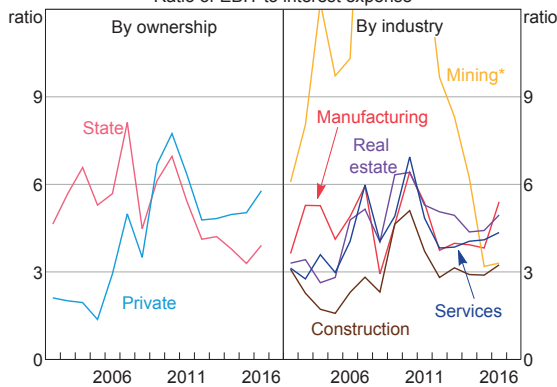
<sup>13</sup> This is corroborated by survey data from 2004/05 and 2011 cited in Lardy (2014, p 108), which suggest there is little difference in the interest rates paid on loans by comparable state and private firms.

<sup>14</sup> The greater risks this deterioration poses could be partially offset by the fact that state firms are presumably more likely to receive assistance from the government in the event of financial stress.

**Graph 8**

**Interest Coverage Ratio**

Ratio of EBIT to interest expense



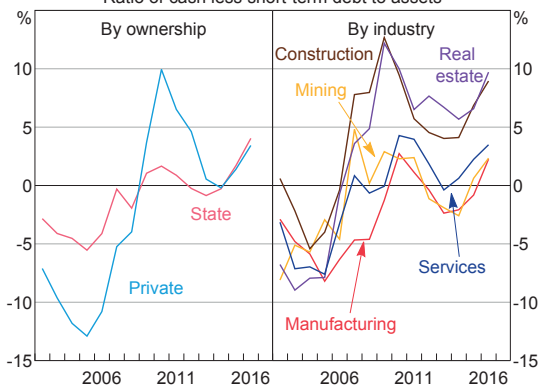
\* The mining industry's average interest coverage ratio peaked at 19.9 in 2007.

Sources: RBA; WIND Information

**Graph 9**

**Liquidity Position**

Ratio of cash less short-term debt to assets



Sources: RBA; WIND Information

**Liquidity and Payments**

An important source of risk for firms is the maturity mismatch between their assets and liabilities. While a firm may be solvent, with relatively low debt and sufficient profitability, a shortage of liquid assets or, equivalently, an abundance of short-term liabilities, can leave it vulnerable to a negative shock. Non-interest-bearing debt liabilities, especially purchases made on credit (i.e. accounts payable), can also be a source of exposure not apparent in debt ratios such as those discussed above.

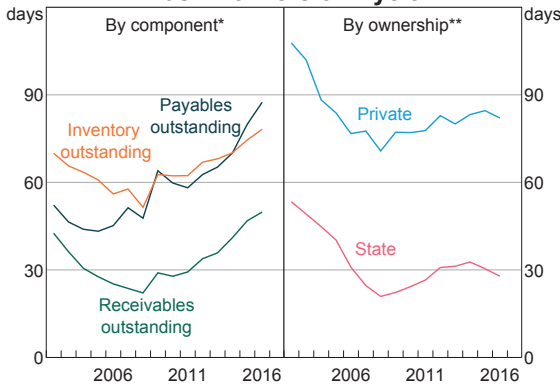
The reduction in short-term debt from almost 20 per cent of assets in 2005 to 10 per cent in 2016 has led to an improvement in firms' liquidity. Firms have also increased their holdings of cash in the past few years, resulting in a positive net liquidity position (the difference between cash and short-term debt liabilities) in aggregate (Graph 9). Several private-sector reports attribute this increase in cash holdings by listed firms to a combination of accommodative monetary conditions and a lack of profitable investment opportunities (evidenced in the wider corporate sector by an increase in corporate demand deposits) (Yeung

and Qu 2016). These reports argue that companies are using the abundance of liquidity to 'hoard' cash rather than to invest. Accordingly, a tightening of financial conditions may result in firms running down their stocks of cash.

State and private listed companies have had similar liquidity positions in recent years, after several years in which private firms' liquidity positions were much higher. The increase in liquidity has also been relatively broad based across industries, although firms in the manufacturing and mining sectors still hold relatively high levels of short-term debt compared to cash. Construction and real estate companies continue to have relatively stronger liquidity positions, largely because they hold more long-term debt. The liquidity positions of 'highly leveraged' companies have improved in the past few years, despite their average leverage increasing, due to a shift towards longer-term debt.

Despite the recent increase in liquidity, the time taken for listed firms to make and receive payments has risen significantly over the past decade (Graph 10). On average in 2016, it took around 90 days for companies to pay suppliers, and around 50 days to receive payment from

**Graph 10**  
**Cash Conversion Cycle**



\* Inventory outstanding and payables outstanding are inventory and payables (respectively) as a share of daily operating costs; receivables outstanding is receivables as a share of daily operating revenues; inventory outstanding excludes real estate firms

\*\* Cash conversion is calculated as inventory outstanding + receivables outstanding – payables outstanding

Sources: RBA; WIND Information

customers.<sup>15</sup> These periods have been increasing through a combination of greater use of credit sales and purchases and a longer time to resolve those transactions. Days of inventory outstanding have also been increasing, driven entirely by state firms. The cash conversion cycle – the time between payment for goods and services provided by suppliers and receiving payment from sales – fell in 2016.<sup>16</sup> This was due to a sharp increase in the time taken to pay suppliers for both private and state firms.

There are substantial variations in cash conversion by ownership and industry. State companies have tended to delay payment to suppliers longer, and have had to wait a shorter time to receive payments from customers than their private counterparts. By industry, real estate and construction companies have taken the most time to pay suppliers, and construction

<sup>15</sup> These ratios are calculated using operating costs and revenue, which will include some costs/revenues that are not directly related to the purchase/sale of products. Accordingly, these measures probably underestimate the number of days outstanding.

<sup>16</sup> Cash conversion is measured by adding days of inventory and receivables outstanding and subtracting days of payables outstanding.

firms have also taken much longer to receive payment from customers than firms in other industries.

## Assessment

Although listed companies represent only a small subset of the total number of firms in China, many of the trends seen in listed company financial measures reflect broader conditions in the Chinese economy. The increase in corporate debt in China, and slowing of overall economic growth, are mirrored in the higher leverage and weaker revenue streams of listed firms over the past decade. By the same token, accommodative financial conditions, reflected in lower interest rates, have assisted in reducing the cost of debt for listed companies across a wide range of industries and contributed to more liquid corporate balance sheets. The improvement in economic conditions in 2016 is also reflected in a broad-based, if modest, improvement in several listed company indicators, including profitability, liquidity and interest coverage.

However, the listed company data point to a number of areas of fragility in the Chinese corporate sector. The erosion of profitability across the whole sample of companies over the past decade has coincided with an increase in the time taken by firms to receive cash from their operations. Another consistent theme is the relatively more vulnerable position of state firms, which have higher leverage, greater declines in profitability and weaker capacity to service interest on their debt than private firms. The high concentration of debt in the most leveraged firms increases the chance that failures among these firms would be more broadly disruptive.

Several industry trends are also worth noting. The high leverage and declining profitability of listed real estate and construction firms highlight the vulnerability of those sectors and

the risk they pose, given the importance that residential construction has played in supporting economic growth in recent years (Cooper and Cowling 2015). The low profitability and liquidity of manufacturing firms is also notable, given the historical importance of this sector to the Chinese economy. Lower profitability, particularly in the manufacturing and real estate sectors, is also likely to have contributed to the overall slowing in Chinese investment. A tightening of monetary conditions over 2017, as has been signalled by some Chinese officials, may support the deleveraging process. However, this is also likely to reduce profitability and increase the cost of debt to firms, especially to those with greater leverage. ↗

## References

- BIS (Bank of International Settlements) (2017)**, *BIS Statistical Bulletin*, March.
- Chivakul M and WR Lam (2015)**, 'Assessing China's Corporate Sector Vulnerabilities', IMF Working Paper WP/15/72.
- Cooper A and A Cowling (2015)**, 'China's Property Sector', *RBA Bulletin*, March, pp 45–54.
- IMF (International Monetary Fund) (2016)**, *Global Financial Stability Report: Potent Policies for a Successful Normalization*, World Economic and Financial Surveys, IMF, Washington DC.
- Lardy N (2014)**, *Markets over Mao: The Rise of Private Business in China*, Peterson Institute for International Economics, Washington DC.
- NDRC (National Development and Reform Commission) (2017)**, 'Report on the Implementation of the 2016 Plan for National Economic and Social Development and on the 2017 Draft Plan for National Economic and Social Development', 5 March. Available at <[http://online.wsj.com/public/resources/documents/NPC2017\\_NDRC\\_English.pdf](http://online.wsj.com/public/resources/documents/NPC2017_NDRC_English.pdf)>.
- RBA (Reserve Bank of Australia) (2016)**, *Financial Stability Review*, October.
- Roberts I and A Zurawski (2016)**, 'Changing Patterns of Corporate Leverage in China: Evidence from Listed Companies' in C Fang, R Garnaut, L Johnston and L Song (eds), *China's New Sources of Economic Growth*, Volume 1, ANU Press, Canberra, pp 271–312.
- Yeung R and D Qu (2016)**, 'Is China in a "Liquidity Trap"?', ANZ Research China Insights, 21 July.
- Yi E and H Liang (2016)**, 'How High is the Funding Cost for Private Investment?', China International Capital Corporation Macro Brief, 21 July.

# The Chinese Interbank Repo Market

Ross Kendall and Jonathan Lees\*

The market for repurchase agreements (repos) is an important source of short-term funding for financial institutions operating in China. This article outlines the key features of Chinese repo markets, focusing on the interbank market, before discussing recent developments and their impact on the bond market. Repo rates have fallen and become less volatile over the past couple of years, encouraging greater risk-taking in financial markets. Policy settings in China have both shaped and responded to these developments.

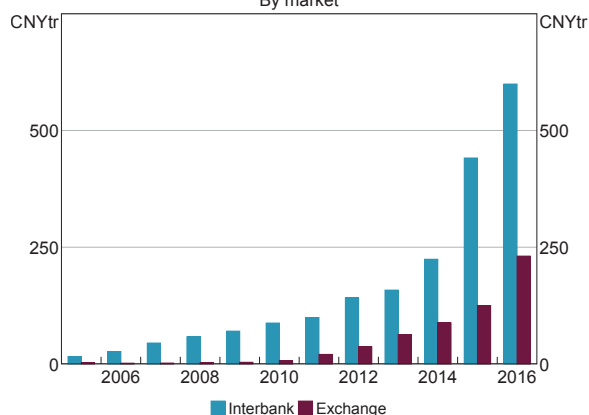
## Introduction

A repo is an agreement between two parties under which the cash borrower sells or pledges a security (usually a fixed income security) to the cash lender, with the collateral bought back or released from the pledge at a later date. Repos are therefore economically equivalent to secured loans and are an important part of short-term funding markets in many economies.

In China, a repo can be conducted as an exchange-traded transaction on the Shanghai or Shenzhen stock exchanges, or 'over the counter' in the interbank market. The exchange-traded market has grown rapidly in recent years.

However, the interbank market – in which a range of bank and non-bank financial institutions are active – is much larger (both in terms of turnover and outstanding lending balances) than the exchange-traded repo market or the unsecured interbank lending market (Graph 1 and Graph 2). The interbank repo market is also used by the People's Bank of China (PBC) to adjust domestic liquidity conditions via open market operations. There is around CNY5 trillion (US\$720 billion) of

**Graph 1**  
**Chinese Repo Turnover**  
By market



Sources: RBA; WIND Information

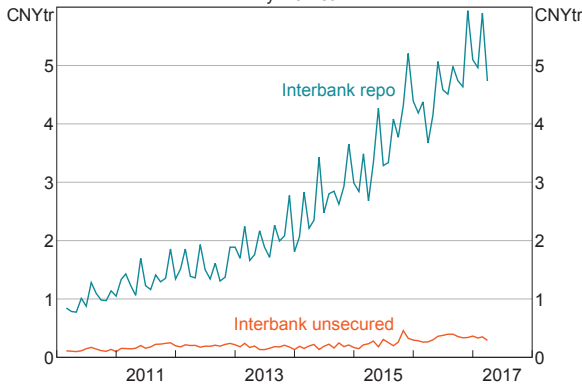
lending outstanding in China's interbank repo market, which is around one-third of the size of the US repo market.<sup>1</sup>

This article focuses on the interbank repo market in light of its systemic importance as a major source of short-term funding, the significant role it plays in the PBC's liquidity management, and the fact that it is viewed by the PBC as

\* The authors are from International Department.

<sup>1</sup> The size of the US repo market is slightly over US\$2 trillion, based on 2016 data on repos outstanding from the Federal Reserve Bank of New York Primary Dealer Statistics database.

**Graph 2**  
**Lending Balance Outstanding**  
By market



Sources: CEIC Data; National Interbank Funding Center

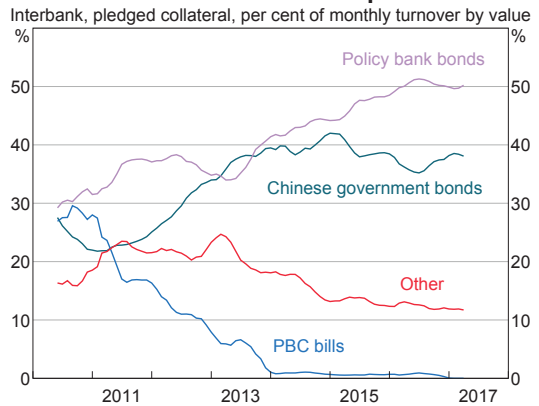
an emerging channel for the transmission of monetary policy. We outline the key features of the market through the lens of the major cash lenders and borrowers, and go on to discuss recent developments, focusing on the build-up of risks and changes to the PBC’s liquidity management framework.

### Ownership of Collateral

As in major repo markets around the world, bonds with low credit risk account for the bulk of collateral used in China’s interbank repo market. In recent years, Chinese government bonds together with bonds issued by China’s policy banks have accounted for nearly 90 per cent of repo collateral (Graph 3).<sup>2</sup> PBC bills historically accounted for a large share of repo collateral, but their usage has declined as the stock of PBC bills outstanding has fallen over time, reaching zero in 2016. Other instruments (mostly corporate and local government bonds) have accounted for

2 Policy banks are state-owned financial institutions that play a quasi-fiscal role in channelling government funding to infrastructure and development projects, and also play a significant role in the financial system.

**Graph 3**  
**Collateral Used in Repos\***



\* Six-month rolling average  
Sources: CEIC Data; China Central Depository & Clearing; RBA

just over 10 per cent of collateral in the interbank repo market over recent years.<sup>3</sup>

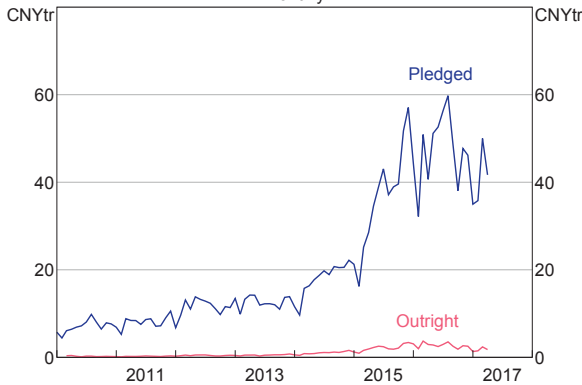
Repos in the Chinese interbank market are generally conducted on a ‘pledged’ basis rather than on an ‘outright’ basis as is common in other major markets (Graph 4). Under an outright repo transaction the ownership of collateral is transferred to the cash lender for the length of the transaction. By contrast, under a pledged repo agreement, ownership of the collateral remains with the cash borrower but is pledged to the lender such that it cannot be used by the borrower for any other purpose until the cash principal and interest is returned.<sup>4,5</sup>

3 In the pledged interbank market, collateral must meet the requirements specified by the cash lender, but is otherwise generic. That is, cash lenders are not able to request specific or ‘special’ securities as collateral as is the case in most major markets. Collateral requirements commonly relate to issuer type, credit rating, tenor and other structural features of the bond (for example, callable bonds are not accepted as collateral by many lenders).

4 Outside of China, repo may also be conducted on a ‘pledged for re-use’ basis, which allows the cash lender to rehypothecate the collateral even though there is no transfer of title.

5 China Central Depository & Clearing (CCDC), a state-owned entity responsible for the registration, custody and settlement of most fixed-income securities in China, is responsible for ensuring that the pledged securities it holds are not used for any other purpose, including being pledged as collateral to another repo, until the transaction has been unwound.

**Graph 4**  
**Interbank Repo Market Turnover**  
 Monthly



Sources: CEIC Data; National Interbank Funding Center

As ownership of the collateral is not transferred to the cash lender in a pledged repo transaction, the lender cannot use (or 'rehypothecate') the collateral for the term of the transaction. This has several important implications for the structure of the market in China. First, it precludes the inter-dealer broker model prevalent in other major repo markets. In this model, a dealer acts as an intermediary by lending cash to one counterparty in exchange for collateral, and using that collateral to borrow cash from another counterparty, taking a spread between the two trades as profit. While market participants may act as intermediaries on an opportunistic basis, the process of on-lending funds in the pledged interbank repo market in China requires substantially more collateral than in repo markets where collateral ownership is transferred outright. Second, pledged repos are less flexible than outright repos. For example, repo markets are commonly used by bond dealers and investors to fund bond positions. This involves purchasing a bond outright and using it as collateral in a repo transaction to borrow the cash needed to fund the bond purchase.<sup>6</sup> Net cash flows are

<sup>6</sup> As transactions do not settle instantaneously, funding may be acquired after the purchase of a bond.

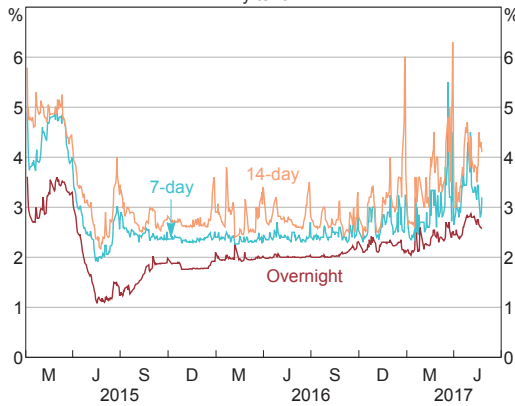
thus zero but the investor gains exposure to the bond. In an outright repo market, the investor can unwind their bond position during the term of the repo by borrowing an equivalent bond under a second repo transaction and selling it outright.<sup>7</sup> This creates a short position that offsets the original long position. However, this is not possible in a pledged repo market as the collateral is not available to be sold. Consequently, in order to retain the ability to exit their positions when desired, bond investors using pledged repo markets to fund their positions are likely to have a preference to borrow cash for shorter terms relative to equivalent investors funding their positions through outright repo markets. Indeed, in the case of China, the use of overnight repos in the pledged repo market increased dramatically during 2015 alongside an increase in the bond-repo carry trade (discussed below).

Finally, if market participants cannot rehypothecate collateral, they have less scope to profit from interest rate differentials. This may go part of the way to explaining the steep slope of the Chinese repo curve, particularly the spread between overnight and 7-day repo rates, which is persistently large (Graph 5). In an outright repo market, participants could take advantage of an interest rate differential such as this by lending cash at the 7-day rate and using the collateral received to borrow at the lower overnight rate. In a pledged repo market, these market participants would need to post their own collateral, increasing the cost of the trade.

<sup>7</sup> In most major markets dealers may also exit a bond position by substituting collateral, or they may use open-ended repos in which the date of the second leg is not specified at the commencement of the transaction. These approaches are not possible in the pledged interbank market.



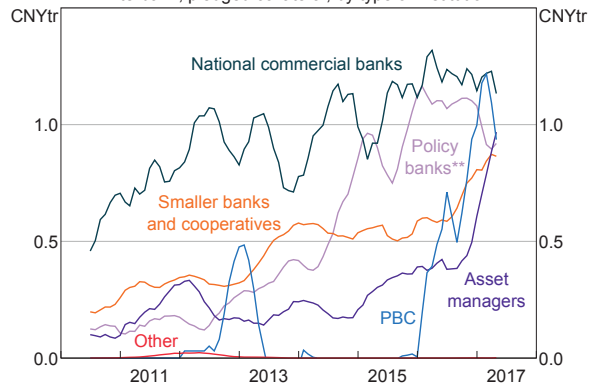
**Graph 5**  
**Interbank Repo Rates\***  
By tenor



\* Fixing repo rates published by the National Interbank Funding Center, calculated as the median rate of trades during the morning of each trading day

Source: CEIC Data

**Graph 6**  
**Outstanding Repo Lending Balance\***  
Interbank, pledged collateral, by type of institution



\* Six-month rolling average

\*\* Relabelled from 'special members' in source data

Sources: CEIC Data; China Central Depository & Clearing; RBA

## Cash Lenders in the Interbank Repo Market

Large Chinese commercial banks have historically been the major suppliers of cash in the interbank pledged repo market (Graph 6). In particular, the large state-owned commercial banks account for a substantial share of lending. This reflects their large retail deposit bases and relatively conservative balance sheet management, which have resulted in more funds being available to lend in the repo market.<sup>8</sup>

In contrast with the large national banks, while smaller banks (referred to as city commercial and rural commercial banks in China) are responsible for a substantial share of lending in the repo market, they have been net borrowers overall. The scale of these institutions' involvement in both the borrowing and the lending sides of the market may be indicative of on-lending activity, whereby institutions take advantage of

opportunities to borrow cash at a lower rate than that at which they can lend. However, it is also likely to reflect differences in repo market activity between institutions within this group.

Another significant source of funds in the interbank repo market is China's policy banks.<sup>9</sup> Policy banks' lending in the repo market has increased rapidly since early 2014, tripling in the space of two years and making them systemically important participants in the market. A large increase in policy banks' funding over recent years, via both bond issuance (the traditional funding source for policy banks) and the PBC's Pledged Supplementary Lending Facility (a facility launched in 2014 that provides low-cost funding to policy banks to support development lending), has contributed to an increase in their capacity to lend. It is possible that policy banks' increased repo activity could have been part of a state-led push to reduce volatility in repo rates (discussed below). The PBC's lending in the interbank pledged repo market, via its open market operations, has also

8 CCDC data on repo activity by 'national commercial banks' cannot be split further between the large state-owned commercial banks and the smaller 'joint-stock banks'. However, data on the source and use of funds in the domestic banking system from the PBC suggest that the four large state-owned commercial banks account for the vast majority of repo lending by this category of banks.

9 Policy banks' activity is recorded in the 'special members' category (Cruz, Gao and Song 2014). Of the three policy banks, China Development Bank (CDB) is the most active in the repo market, with net lending by 'special members' in the pledged repo market closely aligning with figures on repo lending recorded on CDB's balance sheet.

increased rapidly over the past couple of years.<sup>10</sup> This reflects the PBC's preference to manage liquidity conditions through more active use of open market operations rather than through changes to reserve requirement ratios, as well as the decline in the PBC's foreign currency reserves since 2014, which has required offsetting liquidity injections. Like policy bank activity, this increase in the PBC's activity in the repo market is likely to be aimed at reducing the volatility of repo rates.

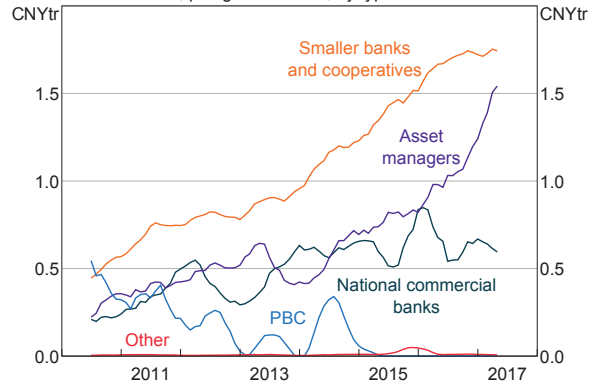
Asset managers use the repo market for liquidity management purposes, and have increased their share of lending over recent years as the value of assets under management has grown.<sup>11</sup> However, their cash lending in the interbank repo market is considerably smaller than their borrowing.

## Cash Borrowers in the Interbank Repo Market

Smaller banks and asset managers account for most of the borrowing in the interbank pledged repo market, with smaller banks accounting for around half of outstanding borrowing (Graph 7). These banks have smaller retail deposit bases than the large state-owned commercial banks, and as a group have been expanding their balance sheets rapidly over recent years, resulting in an increased reliance on wholesale funding such as repo (RBA 2016).

In recent years, asset managers have also increased their borrowing in the interbank pledged repo market, and now account for a significant share of outstanding borrowing. This increase has occurred alongside a sharp increase in the value of these funds' assets under

**Graph 7**  
**Outstanding Repo Borrowing Balance\***  
Interbank, pledged collateral, by type of institution



\* Six-month rolling average  
Sources: CEIC Data; China Central Depository & Clearing; RBA

management, partly reflecting the generally less restrictive regulation of some types of funds management companies compared with banks' activities. Asset managers are likely to have increased their borrowing in the repo market in recent years in order to engage in the bond carry trade (discussed below).

The borrowing by national commercial banks includes borrowing by joint-stock banks (which are smaller than the large state-owned banks that are major suppliers of funds), as well as by the large state-owned banks for the purpose of on-lending. The interest rates on repo agreements in the interbank market are differentiated based on both the quality of collateral offered and the perceived creditworthiness of the borrower (Shevlin and Chang 2015).<sup>12</sup> Larger state-owned banks are perceived as having the highest credit quality, and so borrow at lower rates than smaller banks, while asset managers typically borrow at higher rates than the smaller banks. Higher rated

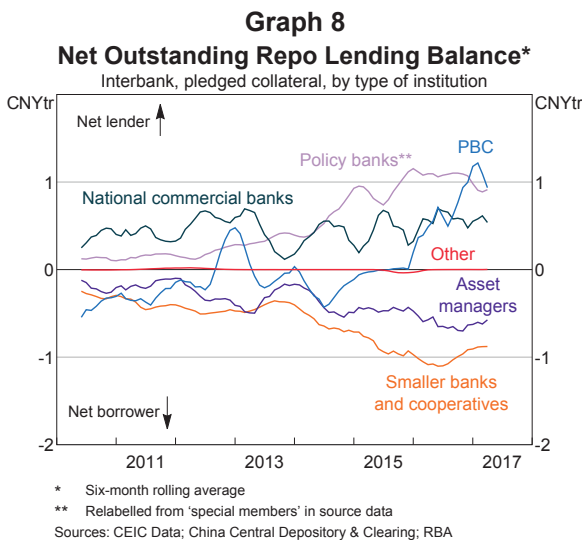
<sup>10</sup> PBC repo lending and borrowing figures are calculated from PBC open market operations. Lending to or borrowing from the PBC is not captured in the data for other institutions, or in the aggregate turnover or balances data.

<sup>11</sup> For the purpose of this article, we group together institutions recorded as fund institutions, insurance institutions, securities companies and non-bank financial institutions as asset managers.

<sup>12</sup> All else being equal, the credit quality of the borrower should matter more under a pledged repo system, to the extent that it is more difficult for the lender to acquire the collateral that has been pledged in the event of a default. The only reported instance of default in China's interbank repo market that we are aware of involved the failure to repay an overnight repo of less than CNY50 million (US\$7 million) in March 2017 (Bloomberg 2017). This reported default has not been officially confirmed.

institutions such as the national commercial banks can therefore borrow at relatively low rates and on-lend at higher rates to smaller (less creditworthy) institutions for profit.

Graph 8 shows net lending in the pledged interbank repo market by type of institution. This measure abstracts from on-lending activities and differences within groups and thus shows the ultimate suppliers and users of funds. In net terms, the policy banks and the PBC are larger suppliers of funds than the national commercial banks, while smaller banks and asset managers are net borrowers.

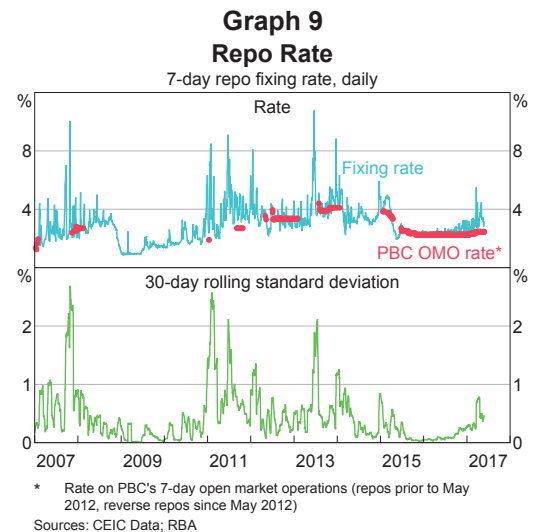


### Recent Developments and Their Implications

In recent years an apparent policy-induced decline in the level and volatility of repo rates has been followed by an increase in leveraged bond investments funded via repo, with an associated build-up of risks in both formal and informal markets. The PBC has responded with measures to discourage excessive risk-taking, including by extending the term of open market operations and allowing short-term interest rates to increase and become more volatile.

### The reduction in the volatility of repo rates

The volatility of Chinese repo rates declined significantly over 2015 and has generally remained low since then, notwithstanding an increase since the second half of 2016 (Graph 9). One factor contributing to lower volatility was the introduction of reserve averaging for banks in September 2015 (IMF 2016).<sup>13</sup> However, the increased involvement of policy banks and the PBC in the repo market suggests a broader policy objective by the Chinese authorities to dampen volatility. A working paper co-authored by the chief economist of the PBC's research bureau in early 2016 supports this assessment (Ma *et al* 2016). Specifically, it recommends shifting monetary policy from the current approach (focused on quantitative lending targets, 'window guidance' and central guidance of benchmark lending and deposit rates) towards an interest rate corridor approach – a shift that has also been encouraged by the International Monetary Fund (IMF 2016). The working paper also emphasises the importance of improving the transmission

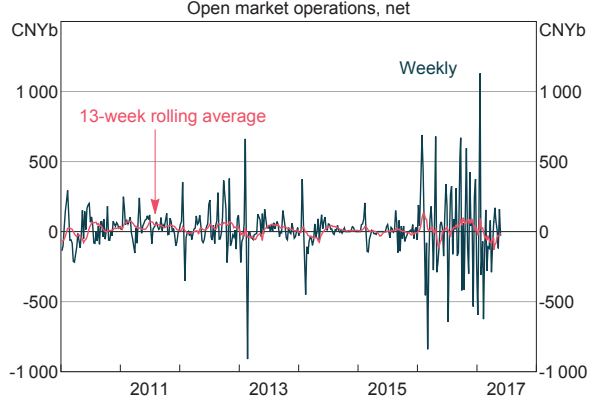


13 The rule change allows banks to report a required reserve ratio up to 1 per cent lower than the compulsory ratio set by the PBC on any given day, as long as they meet the requirement on average during an assessed period.

from short-term rates (particularly the 7-day repo rate) to other rates in the economy. A February 2017 article from PBC Assistant Governor Zhang Xiaohui reiterates these goals. It states that the transmission from short-term rates (especially the 7-day repo rate and the rates on the PBC's Medium-term Lending Facility) to bond rates and bank loan rates has improved (Zhang 2017).

Policy banks increased their lending in the interbank pledged repo market from early 2014, with their share of outstanding loans rising from around 20 per cent to almost 40 per cent by early 2015 (Graph 10). In early 2016, the share of policy and central bank lending grew further as the PBC increased its activity in the repo market. At the same time, the PBC started managing liquidity more actively, increasing the size of injections and withdrawals and moving from bi-weekly open market operations to daily open market operations (Graph 11). This enabled the PBC, like other central banks, to mitigate short-term fluctuations in liquidity conditions more effectively, such as those arising from large tax payments or seasonal demand for cash.

**Graph 11**  
**PBC Liquidity Injections and Withdrawals**  
Open market operations, net



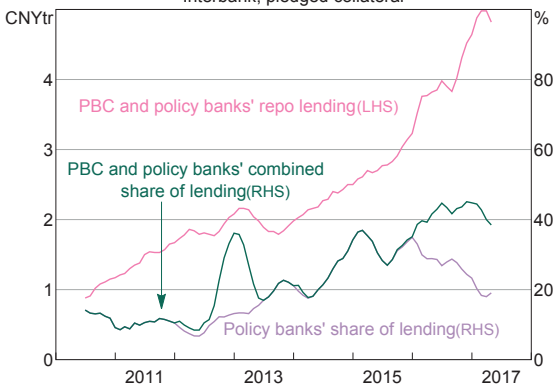
Source: Bloomberg

**The bond carry trade**

The structural decline in the volatility of repo rates has given rise to a consistent spread between yields on short-term repos and long-term bonds. This spread facilitates the bond ‘carry trade’, a leveraged bond investment in which the investor receives the higher long-term interest rate, but pays the lower shorter-term rate (that is, the investor buys a bond and pledges it in exchange for cash through the repo market). Reports suggest that the combination of the low level and low volatility of repo rates has indeed led to an increase in leveraged bond investments (Bloomberg 2016; Dongming 2016; Xinhua Finance Agency 2016), and PBC commentary has noted risks to financial institutions related to maturity mismatch (Zhang 2017).

In the case of investments in long-term bonds funded via short-term repo, the trade is subject to refinancing risk whereby the interest differential earned on the trade is eroded or becomes negative if repo rates increase. The carry trade is also subject to the risk of capital losses. This risk is magnified by the leveraged nature of the investment, with the result that investors funding positions through the repo market are highly sensitive to moves in bond yields.

**Graph 10**  
**PBC and Policy Banks' Repo Lending\***  
Interbank, pledged collateral



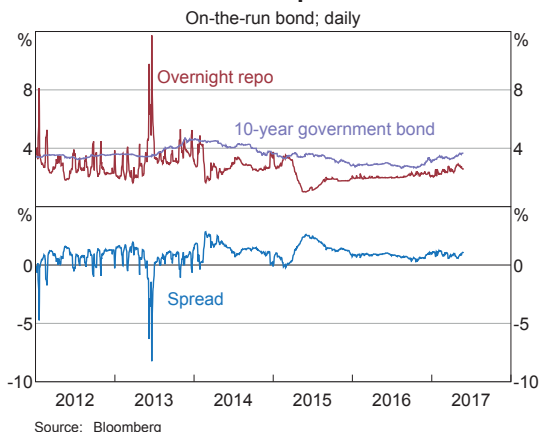
\* Six-month rolling average  
Sources: CEIC Data; China Central Depository & Clearing; RBA

The widest and most consistent spread has been between overnight repo and long-term bonds (Graph 12). This has likely contributed to the sharp increase in overnight repo turnover that occurred from early 2015 alongside growth in repo borrowing by smaller banks and asset managers (Graph 13). On the investment side, liquidity as measured by bid-ask spreads improved steadily over the same period, with the carry trade increasing bond trading volumes in an environment of low and stable interest rates. However, to the extent that bond market liquidity is supported by the carry trade it can be expected to deteriorate quickly when interest rates rise.

There was some evidence of this in the December quarter of 2016, when bid-ask spreads widened alongside increases in repo market volatility and bond yields. More generally, the build-up in leveraged bond investments appears to have increased the sensitivity of the bond market to volatility in repo rates. For example, in 2013 large increases in repo rates had little impact on the bond market, while a relatively minor pick-up in the level and volatility of repo rates in late 2016 contributed to a material increase in yields.

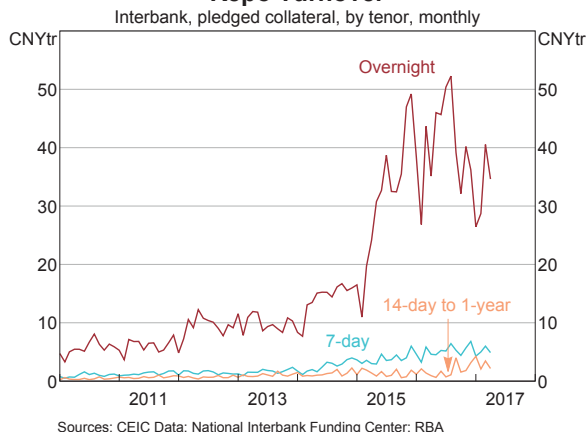
Part of the pick-up in the level and volatility of repo rates over the second half of 2016 has reflected the increased share of borrowing by

**Graph 12**  
**Bond and Repo Rates**



Source: Bloomberg

**Graph 13**  
**Repo Turnover**



Sources: CEIC Data; National Interbank Funding Center; RBA

asset managers over this period (in addition to changes to the PBC's liquidity operations, discussed below). On average, asset managers are likely to borrow at a higher rate than banks (reflecting higher perceived credit risk, Shevlin and Chang (2015)), contributing to a rise in average repo rates as these institutions' share of turnover increases. Asset manager activity also contributes to higher volatility to the extent that the rates at which these institutions can borrow are more sensitive to changes in credit risk appetite. In December 2016, repo rates rose substantially as the premium paid by asset managers to borrow relative to banks increased sharply. This premium rose in response to concerns regarding the use of informal repo agreements known as 'dai chi' by some interbank repo market participants.

**The dai chi market**

*Dai chi* (which translates as *holding something on someone's behalf*) is the practice of selling a bond in exchange for cash, and buying back the bond later at a price and date agreed at the start of the trade. *Dai chi* agreements are economically equivalent to a repo agreement, but do not take place via the interbank or exchange-traded

markets and are often informal in nature.<sup>14</sup> For example, *dai chi* agreements have reportedly been struck using instant messaging services. Due to this informality, some transactions undertaken in this market may not be legally enforceable.

There are several reasons that market participants may elect to transact in the *dai chi* market instead of in formal repo markets. *Dai chi* transactions can be used to remove assets from balance sheets for the period of the loan, circumventing regulatory limits on leverage. *Dai chi* also allows collateral to be rehypothecated, facilitating greater flexibility and leverage than pledged repo.

Though few data are available on this informal market, the practice is reportedly widespread. The president of CCDC has estimated that the value of *dai chi* outstanding may be as high as CNY12 trillion (US\$1.7 trillion), which would make it twice as large as the interbank repo market (Dong 2016; Hong 2017). Without knowing the types of collateral used, the enforceability of contracts or the creditworthiness of the institutions involved, it is difficult to make an assessment of the risks involved with this activity. However, the informality of the *dai chi* market suggests that risks are likely to be higher than in the formal repo market. Moreover, there is likely to be some degree of overlap between participants in the formal and informal repo markets, such that risks that manifest in the *dai chi* market could spill over into the interbank and exchange-traded markets.

In mid December 2016 the asset management firm Sealand Securities announced that two former directors had forged CNY16.5 billion (US\$2.4 billion) in *dai chi* contracts in transactions with a number of other financial institutions. Sealand's announcement cast doubt over whether

the firm would buy back the bonds being held in relation to the fraudulent transactions, which at the time were carrying mark-to-market losses of around CNY1 billion (US\$145 million), or 7 per cent of the firm's shareholder equity.

The announcement resulted in volatility in interest rate markets. In the formal repo market, cash lenders became reluctant to provide funding to non-bank financial institutions, with the spread between interest rates paid by these institutions and those paid by banks increasing sharply.<sup>15</sup> In the bond market, yields rose significantly and bid-ask spreads widened. However, this dislocation was short lived as the China Securities Regulatory Commission was reported to have stepped in to force a resolution and large Chinese banks reportedly increased their lending in the repo market via 'X-repo'. X-repo is a repo facility launched by the PBC in 2015 to anonymously match interbank repo lenders and borrowers, with standardised collateral and haircut requirements. Lending through X-repo ensured access to financing for non-bank financial institutions that were unable to borrow via traditional repos due to the spillover of credit concerns from the *dai chi* market into the interbank market.

### Extension to the term of the PBC's market operations

The increased use of leveraged bond purchases and informal repo markets has increased the level of risk in China's financial system. In August 2016, in an apparent response to these risks, the PBC started augmenting its standard 7-day open market operations with 14- and 28-day terms. While there was no official comment on the change in approach at the time, there were widespread reports (Reuters 2016) that

<sup>14</sup> The information on the *dai chi* market is based on Dong (2016), Moriyasu (2016), BIS (2017), Hong (2017) and Long (2017).

<sup>15</sup> The gap between a measure of the 7-day repo rates that includes borrowing by all types of financial institutions and one that includes only borrowing by deposit-taking institutions spiked to around 100 basis points in late December from a normal range of around 10 to 30 basis points.

the PBC was trying to reduce the extent of leveraged bond purchases by encouraging less use of overnight repos and greater use of (more expensive) longer-term repos.

In February, PBC Assistant Governor Zhang noted that the change to the PBC's open market operations had the practical effect of mitigating financial institutions' maturity mismatch and liquidity risks (Zhang 2017). Overnight repo turnover has fallen since the change, with some investors in the bond carry trade likely to have been deterred by the resulting increase in the level and volatility of repo rates.

## Conclusion

Chinese repo markets have expanded rapidly in recent years, consistent with the broader development of China's financial markets. This growth has provided financial market participants with the depth and liquidity necessary to effectively manage their short-term assets and liabilities. Moreover, the repo market's development is viewed by the PBC as supporting further moves toward a monetary policy framework based on targeting a short-term interest rate in the future. However, as in other financial markets, the expansion of short-term funding markets can give rise to financial stability risks, especially where these markets are informal in nature. Risks appear to have risen with the growth in China's repo markets, and the policy landscape is responding to these risks. ✎

## References

- BIS (Bank for International Settlements) (2017)**, 'Box B: From Wealth Management Products to the Bond Market', *BIS Quarterly Review*, March.
- Bloomberg (2016)**, 'China's \$1 Trillion Bond Leverage Unwinds as Pimco Senses Panic', bloomberg.com site, 28 April, viewed 23 May 2017. Available at <<https://www.bloomberg.com/news/articles/2016-04-27/china-s-1-trillion-bond-leverage-unwinds-as-pimco-senses-panic>>.
- Bloomberg (2017)**, 'PBOC Said to Inject Funds After Missed Interbank Payments', bloomberg.com site, 21 March, viewed 23 May 2017. Available at <<https://www.bloomberg.com/news/articles/2017-03-21/pboc-said-to-inject-liquidity-after-interbank-payments-missed-j0jejfd>>.
- Cruz PC, Y Gao and LL Song (2014)**, 'The People's Republic of China's Financial Markets: Are They Deep and Liquid Enough for Renminbi Internationalization?', Asian Development Bank Institute Working Paper Series 477.
- Dong J (2016)**, '中债登估算代持规模12万亿 建议改进回购交易' (Scale of *Dai Chi* Market Estimated at RMB12 Trillion, Changes Proposed to Improve Repo Market), caixin.com site, 27 December, viewed 23 May 2017. Available at <<http://finance.caixin.com/2016-12-27/101030995.html>>.
- Dongming TX (2016)**, 'The Cause of the Current Bond Market Turmoil?', OCBC Bank China Insights, 19 December, viewed 23 May 2017. Available at <<https://www.ocbc.com/assets/pdf/regional%20focus/china/china%20insights/2016/china%20insights%2019122016.pdf>>.
- Hong S (2017)**, 'Behind China's Bond Selloff, a Risky Twist on the Repo Trade', *The Wall Street Journal Online*, 17 January, viewed 23 May 2017. Available at <<https://www.wsj.com/articles/behind-chinas-bond-selloff-a-risky-twist-on-the-repo-trade-1484654059>>.
- IMF (International Monetary Fund) (2016)**, 'The People's Republic of China: Selected Issues', IMF Country Report No 16/271.
- Long C (2017)**, 'Dodging a Bullet in the Interbank Market', Gavekal Dragonomics China Ideas, 19 January.
- Ma J, H Hong, Y Jia, S Zhang, LH Yin and G An (2016)**, 'The Role of Yield Curves in Monetary Policy Transmission', People's Bank of China Working Paper No 2016/1.
- Moriyasu K (2016)**, 'China Bonds the Latest Bubble to Pop', *Nikkei Asian Review*, asia.nikkei.com site, 22 December, viewed 23 May 2017. Available at <<http://asia.nikkei.com/Markets/Capital-Markets/China-bonds-the-latest-bubble-to-pop?page=1>>.
- RBA (Reserve Bank of Australia) (2016)**, 'Box A: Recent Growth of Small and Medium-sized Chinese Banks', *Financial Stability Review*, October, pp 14–16.

**Reuters (2016)**, 'China Central Bank Urges Banks to Spread Out Tenors of Loans: Sources', reuters.com site, 25 August, viewed 23 May 2017. Available at <<http://www.reuters.com/article/us-china-economy-centralbank-liquidity-idUSKCN110065?il=0>>.

**Shevlin A and A Chang (2015)**, 'China's Repo Markets: The Structure and Safeguards of China's Largest, Most Liquid Money Market Instruments', J.P. Morgan Liquidity Insights, viewed 23 May 2017. Available at <<https://am.jpmorgan.com/au/en/asset-management/gim/liq/liquidity-insights/chinas-repo-markets>>.

**Xinhua Finance Agency (2016)**, 'Regulators Survey Risk of RMB5 Trln Leverage Fund in Bond Market', xfafinance.com site, 21 April, viewed 23 May 2017. Available at <[http://en.xfafinance.com/html/In\\_depth/2016/216356.shtml](http://en.xfafinance.com/html/In_depth/2016/216356.shtml)>.

**Zhang X (2017)**, '货币政策回顾与展望' (Review and Prospect of Monetary Policy), *China Finance*, No 3, 3 February. Republished on business.sohu.com site, viewed 23 May 2017. Available at <<http://business.sohu.com/20170203/n479832292.shtml>>.





# Reserve Bank Publications

Most of the publications listed below are available free of charge on the Bank's website ([www.rba.gov.au](http://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, published semiannually, 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)

This series of papers is intended to make the results of current economic research within the Bank available for discussion and comment. The views expressed in these papers are those of the authors and not necessarily those of the Bank.

Abstracts or introductions of all RDPs, and the full text of RDPs published since 1988, are available on the Bank's website.

## Conference Volumes

Conference volumes have been published on the Bank's website since 1993. The most recent titles are:

- *Structural Change in China: Implications for Australia and the World*, March 2016
- *Small Business Conditions and Finance*, March 2015
- *Financial Flows and Infrastructure Financing*, July 2014

## 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:

- *Dual-Network Cards and Mobile Wallet*, December 2016
- *Technology: Consultation Paper*, December 2016
- *Survey of Foreign Exchange and Derivatives Markets*, September 2016
- *Reserve Bank of Australia Corporate Plan*, 2016/17
- *Review of Card Payments Regulation: Conclusions*, May 2016
- *Consultation on Changes to the Bank's Standards for Card Payment Systems*, December 2015

## Recent Bulletin Articles

### March Quarter 2017

The Recent Economic Performance of the States  
 Insights into Low Wage Growth in Australia  
 Housing Market Turnover  
 Inflation Expectations in Advanced Economies  
 Developments in Banks' Funding Costs and Lending Rates  
 Returns on Equity, Cost of Equity and the Implications for Banks  
 How Australians Pay: New Survey Evidence  
 Recent Trends in Banknote Counterfeiting  
 The Rise of Chinese Money Market Funds

### December Quarter 2016

The Sensitivity of Personal Income to GDP Growth  
 Factors Affecting an Individual's Future Labour Market Status  
 Measures of Inflation Expectations in Australia  
 The Cash Market  
 The Future of Cash  
 The Effect of Chinese Macroeconomic News on Australian Financial Markets  
 Developments in Foreign Exchange and OTC Derivatives Markets  
 Macroprudential Policy Frameworks and Tools

### September Quarter 2016

New Banknotes: From Concept to Circulation  
 Sensitivity of Australian Trade to the Exchange Rate  
 The Household Cash Flow Channel of Monetary Policy  
 Chinese Household Income, Consumption and Savings  
 Developments in the Australian Repo Market  
 The Kangaroo Bond Market  
 Banks' Wealth Management Activities in Australia  
 GDP-linked Bonds  
 Sources of Financial Risk for Central Counterparties

## Recent Speeches

Panel participation by Tony Richards, Head of Payments Policy, at the Australian Retail Banking Summit 2017, Tony Richards, Head of Payments Policy Department, May 2017

Panel Discussion of the FX Global Code at the GFMA Global FX Division, Guy Debelle, Deputy Governor, May 2017

Plans for promoting adherence to the Code, Discussion at the GFMA Global FX Division, Guy Debelle, Deputy Governor, May 2017

Panel Participation at the Launch of the FX Global Code, FX Week, Guy Debelle, Deputy Governor, May 2017

Opening Remarks at the Launch of the FX Global Code, Guy Debelle, Deputy Governor, May 2017

How I Learned to Stop Worrying and Love the Basis, Guy Debelle, Deputy Governor, May 2017

The Louisa Macdonald Oration, Alexandra Heath, Head of Economic Analysis Department, May 2017

Household Debt, Housing Prices and Resilience, Philip Lowe, Governor, May 2017

Renminbi Internationalisation, Philip Lowe, Governor, April 2017

Recent Trends in Australian Capital Flows, Guy Debelle, Deputy Governor, April 2017

Remarks and panel participation at the Bloomberg Voices event, Alexandra Heath, Head of Economic Analysis Department, April 2017

Remarks at Reserve Bank Board Dinner, Philip Lowe, Governor, March 2017

The FX Global Code of Conduct – Final Phase, Guy Debelle, Deputy Governor, March 2017

Regulatory Overview: The FX Global Code – Defining the Next Steps Towards a Standard Industry Code of Conduct, Guy Debelle, Deputy Governor, March 2017

Women in the Economy and in Economics, Luci Ellis, Assistant Governor (Economic), March 2017

# Copyright and Disclaimer Notices

## Australian Property Monitors

The following Copyright and Disclaimer Notices apply to data on dwelling prices obtained from Australian Property Monitors (APM) and reported in the article 'Houses and Apartments in Australia' in this issue of the *Bulletin*.

In compiling this data, APM relies upon information supplied by a number of external sources. The information is supplied on the basis that while APM believes all the information in it will be correct at the time of publication, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by subscribers, or by any other person or body corporate arising from or in connection with the supply or use of the whole or any part of the information in this publication through any cause whatsoever and limits any liability it may have to the amount paid to the Publisher for the supply of such information.

## New South Wales Land and Property Information

Contains property sales information provided under licence from the Land and Property Information. Australian Property Monitors Pty Ltd is authorised as a Sales Information Provider by the Land and Property Information.

## State of Victoria

The State of Victoria owns the copyright in the Property Sales Data and reproduction of that data in any way without the consent of the State of Victoria will constitute a breach of the *Copyright Act 1968* (Cth). The State of Victoria

does not warrant the accuracy or completeness of the Property Sales Data and any person using or relying upon such information does so on the basis that the State of Victoria accepts no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information supplied.

## State of Queensland

© State of Queensland (Department of Natural Resources and Mines) 2017. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

## Government of the State of South Australia

### Warning

The information contained in this dataset is extracted from records of land status and cadastral boundary definition held by the Government of South Australia (the 'State'). The information is not represented to be accurate, current, complete, or suitable for any purpose, at the time of its supply by the State, and may have changed since the date of supply by the State. The software by which the information is provided is not represented to be error free. No responsibility is accepted by the State for any reliance placed by any person upon

the information, or the software by which it is provided. Persons acquiring or using the information and its associated software must exercise their independent judgement in doing so.

### Copyright

Copyright in the information remains with the Crown in right of the State of South Australia. The information is reproduced under licence from the Crown.

### Privacy

The information contained in this dataset must not be used for the purposes of compiling contact lists, whether personalised or not.

### Crown in Right of Tasmania

This product incorporates data that is copyright owned by the Crown in Right of Tasmania. The data has been used in the product with the permission of the Crown in Right of Tasmania. The Crown in Right of Tasmania and its employee and agents:

- a. give no warranty regarding the data's accuracy, completeness, currency, or suitability for any particular purpose
- b. do not accept liability howsoever arising including but not limited to negligence for any loss resulting from the use of or reliance upon the data.

### Australian Capital Territory

The Territory Data is the property of the Australian Capital Territory. No part of it may in any form or by any means (electronic, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior permission. Enquiries should be directed to: The Executive Director, ACT Planning and Land Management, GPO Box 1908, Canberra, ACT 2601.

### Northern Territory

Copyright in the underlying data for the Northern Territory is owned by the Northern Territory of Australia represented by the Department of Infrastructure, Planning and Environment for which no responsibility is accepted.

Western Australian Land Information Authority (Landgate)

Western Australian Land Information Authority (2013) trading as Landgate. Based on information provided by and with the permission of the Western Australian Land Information Authority (2013) trading as Landgate.

