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Household Wealth in Australia: Evidence from the 2014 HILDA Survey

Paul Ryan and Tahlee Stone*

This article uses data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey to assess how the distribution of wealth changed for Australian households between 2010 and 2014. Average household wealth increased modestly over that period, driven mainly by growth in the value of financial assets, most notably superannuation. The growth of housing wealth was slow in comparison, particularly in Queensland and Western Australia. While most of the changes in wealth were broadly based across households, wealth increased more rapidly for those residing in New South Wales and for retired households with large holdings of superannuation and equity assets.

Introduction

The HILDA Survey has been conducted annually since 2001. Every four years the survey includes a wealth module, which asks respondents detailed questions about their holdings of assets and liabilities. The results of the 2014 wealth module were released recently. As the survey is designed to track the same respondents each period, it provides an insight into how particular households' assets and liabilities have evolved over time.[1]

Previous *Bulletin* articles have used earlier releases of the HILDA Survey to describe the distribution of household assets and liabilities across a number of dimensions, including by income, wealth, age, employment and homeownership status.[2] As the general distribution of household wealth (i.e. total assets minus total debts) across these categories is broadly the same in 2014 as it was in 2010, this article focuses on how the distribution of housing assets (including investment properties), non-housing assets (predominately superannuation) and household debt have changed between 2010 and 2014.

The HILDA Survey data suggest that the average Australian household had total wealth of around $740 000 in 2014. Measures of real (inflation adjusted) wealth per household from the HILDA Survey grew a little less over the decade to 2014 than measures based on household-level data from the Australian Bureau of Statistics (ABS) Survey of Income and Housing (SIH) and distributional wealth indicators from the ABS that are consistent with aggregate data from the Australian System of National Accounts (ASNA) (Graph 1).[3,4] However, the value of assets grew faster than the stock of new debt across all three measures.

* Paul Ryan is from Economic Analysis Department and Tahlee Stone is from Economic Research Department.

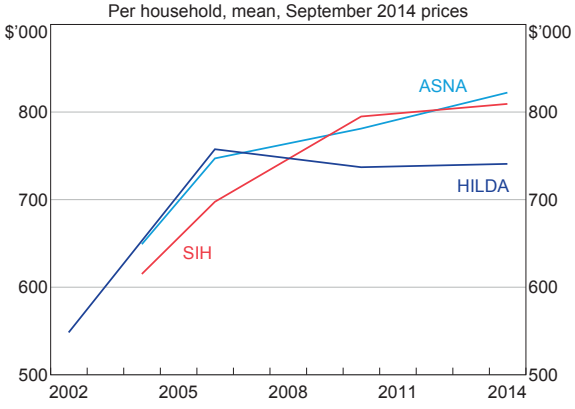
1 Respondents can drop out of the HILDA Survey due to death, a move overseas, loss of contact with the survey, or a refusal to remain in the survey; the newly formed households created by the split of an existing household remain in the survey. For more information on the HILDA Survey, see <http://www.melbourneinstitute.com/hilda>.

2 See Kohler, Connolly and Smith (2004), Bloxham and Betts (2009) and Finlay (2012). Additional data, including from previous HILDA releases, are available from Statistical Tables E3–E7 on the Reserve Bank website <http://www.rba.gov.au/statistics/tables/>.

3 The Consumer Price Index is used to adjust wealth data for the change in purchasing power between the periods due to inflation. All real values are reported in September quarter 2014 dollars.

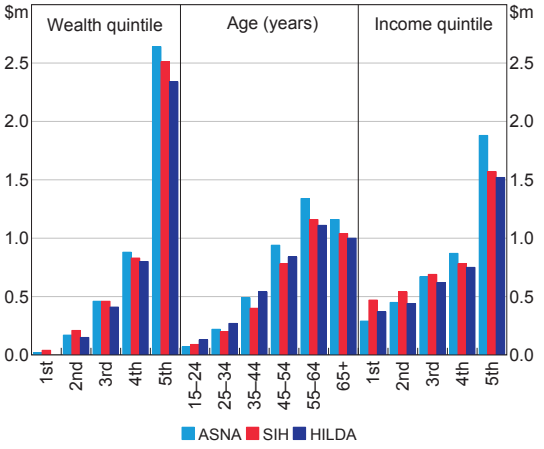
4 The ASNA indicator will be referred to as the 'national accounts consistent distributional measure' as it integrates household-level survey data from the SIH with macro-level data from the national accounts. For more information on the national accounts consistent distributional measures constructed by the ABS, see (ABS 2013) for more details.

Graph 1
Real Household Wealth
Per household, mean, September 2014 prices



Sources: ABS; HILDA Release 14.0; RBA

Graph 2
Household Wealth
Per household, mean



Sources: ABS; HILDA Release 14.0

The divergences in the three measures of average wealth over the past decade reflect a number of differences in measurement and coverage.[5] Part of this is likely to be due to the difficulty all household surveys encounter with surveying very wealthy households, and the challenges in scaling survey data to reflect aggregate demographic characteristics.

Looking at the cross-sectional distribution of household wealth, older and higher-income households tend to have higher levels of wealth (Graph 2). A comparison of wealth in the HILDA Survey with the distributional measures available from the ABS surveys suggests that they are broadly similar, although the level of wealth across different cross-sections is generally estimated to be a little lower in the HILDA Survey, particularly for high-income and very wealthy households.

The distribution by wealth quintile shows that wealth is very unequally distributed: the average level of wealth for households in the top wealth quintile is over four times that of households in the middle quintile. The age profile shows how households accumulate wealth in the lead-up to retirement. Given that the distributional patterns of household wealth are consistent across the different data sources, the rest of this article focuses on the data from the HILDA Survey.

Household Wealth

Overall, almost 60 per cent of households in the HILDA Survey had more real wealth in 2014 than was the case in 2010.[6] Households with the lowest levels of wealth in 2010 saw the most growth of wealth over the four years to 2014 (Graph 3). This partly reflects the fact that low-wealth households are generally young and are just starting to build wealth. Correspondingly, younger households saw growth of wealth than older households.[7] Higher-income households, with the most wealth-building capacity, increased wealth at a faster rate than low-income households.

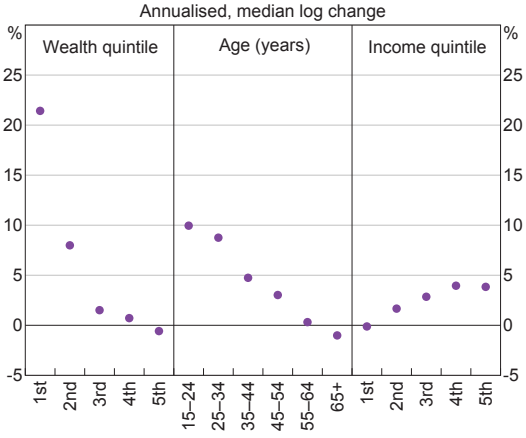
Looking at the aggregate change in wealth for Australian households implied by the HILDA Survey, most of the increase in wealth over the 2010–14 period came from growth in the value of non-housing assets, which are predominantly financial assets such as superannuation, equities

5 For more information on the differences between HILDA and the aggregate national accounts, see Headey, Warren and Wooden (2008).

6 This number includes households who are net debtors, while estimates shown in Graph 3 only include households with positive net wealth in 2010 and 2014.

7 This analysis does not control for interactions between age and wealth which might be important.

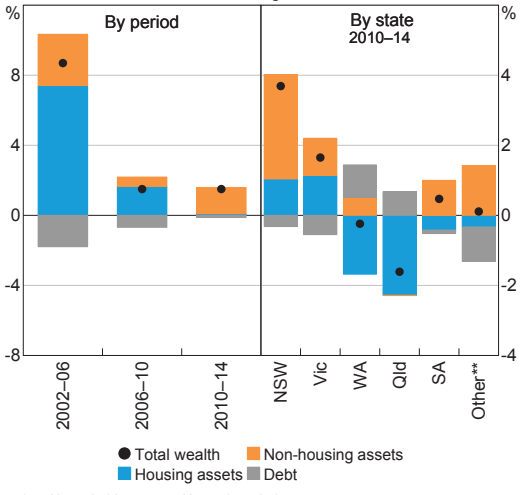
Graph 3
Real Growth of Household Wealth*
Annualised, median log change



* Households surveyed in 2010 and 2014 with positive net wealth
Sources: HILDA Release 14.0; RBA

and deposits (Graph 4). The real value of households' housing assets increased slightly over the period and households taken together increased their level of average debt only marginally. This contrasts with growth in household wealth over the 2002–06 and 2006–10 periods, which was primarily driven by growth in the value of housing assets.

Graph 4
Real Growth of Household Wealth*
Contribution to mean growth, annualised



* Households surveyed in each period
** Consists of the ACT, NT and Tasmania
Sources: HILDA Release 14.0; RBA

Households across the different states and territories also fared quite differently between 2010 and 2014. Households in New South Wales and Victoria saw the largest increase in wealth, with growth in both housing and non-housing assets, while households in Queensland and Western Australia saw the biggest decrease in wealth, on average, mainly owing to a fall in the value of housing assets. The other states and territories generally saw relatively little growth in wealth over the period. The outcomes for households in Queensland and Western Australia are likely to have been influenced by the decline in commodity prices and the mining investment boom following the peak, which occurred between 2010 and 2014.

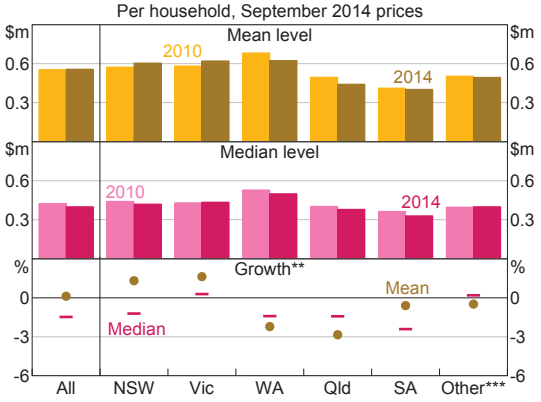
The following sections consider in more detail how housing assets, debt and non-housing assets developed for different households over the 2010–14 period.

Housing Assets

Housing is the largest asset class on Australian households' balance sheets, accounting for around 60 per cent of total assets. Over any given period, growth in housing assets can be due to a change in housing prices or a change in the stock of housing held by Australian households. As discussed above, households in the HILDA Survey reported weak annual average growth in the real value of their housing assets between 2010 and 2014, although growth in housing varied substantially across different states and territories. Looking more closely across the states reveals large differences in the mean and median values of housing assets (Graph 5).[8] Similar state-level patterns are also observed in the SIH data. According to the HILDA Survey almost all of the growth in housing assets from 2010 to 2014 was due to changes in the price of housing assets, rather

8 Both mean and median statistics are reported in Graph 5 to provide a more detailed picture of how housing assets changed over the survey period. The mean describes an average value, while the median is more representative of a 'typical' household since it describes the household in the middle of the distribution and is less sensitive to extremely low and high values.

Graph 5
Real Housing Assets*
Per household, September 2014 prices



* Households surveyed in 2010 and 2014 with positive housing assets
** Annualised percentage change
*** Consists of the ACT, NT and Tasmania
Sources: HILDA Release 14.0; RBA

than changes in the quantity of housing assets held by households. This is consistent with aggregate ABS statistics over the period.

New South Wales and Victoria were the only states where households reported growth in the real average value of housing assets between 2010 and 2014, while Queensland and Western Australia reported that real housing asset values declined. This contrasts to the period of strong growth reported for Western Australia and Queensland in the HILDA Survey from 2002 to 2006.[9] However, even with the decline in housing asset values over recent years, households in Western Australia still reported the highest value of housing assets in 2014.

The fact that median housing asset values decreased in NSW, while mean housing asset values grew, suggests that households with a larger value of housing assets in this state experienced strong growth in housing assets over the period. This result aligns with the strong demand for higher-priced detached dwellings in Sydney relative to demand for dwellings in other areas of New South Wales.

9 During this earlier period, the median real value of non-financial assets (predominately housing) assets grew by 20 and 15 per cent a year for Queensland and Western Australia, respectively. See Bloxham and Betts (2009).

State-level differences in the growth of real housing asset values are consistent with differences in state housing market conditions over the period. In New South Wales and Victoria, stronger average housing price growth reported by the ABS between 2011 and 2014 has been driven particularly by investor demand for housing. In Queensland and Western Australia, demand for housing is likely to have been affected by the peak of the mining investment and commodity prices during the 2010–14 period and households having lowered their expectations for growth in population and household incomes.

Despite this, housing ownership rates in the HILDA Survey remained fairly stable across the states between 2010 and 2014. Overall, around 66 per cent of all households in Australia own their primary place of residence and 20 per cent of households own other property (including investment property). Similar to previous surveys, home ownership typically increases with income, wealth and age (until retirement), and ownership of other property was highest for households where the household head is aged 45 to 64 years.

The data also allow analysis on which households entered the housing market or increased their housing asset holdings between 2010 and 2014. This shows that the share of households that either became home owners for the first time or upgraded their main residence decreased relative to the 2006–10 period (Graph 6). This was particularly apparent for households aged 25 to 44 years. Households in this age range were more likely to have increased their holdings of other property assets, while those aged 15 to 24 years were less likely to invest in other property than they were between 2006 and 2010 (Graph 6).

Although households aged between 55 and 64 years were also less likely to purchase housing assets over this period than over the previous four years, they remained the age group with the highest rates of property ownership and were the

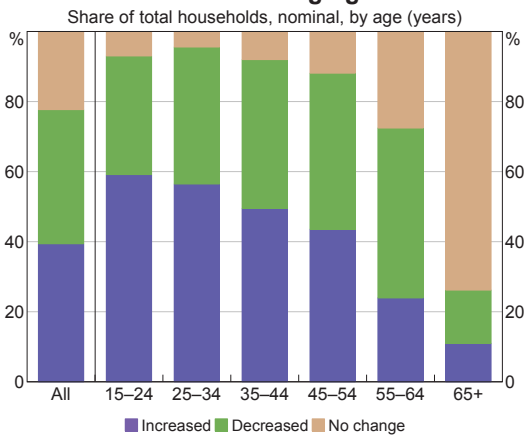
Graph 6
Propensity to Purchase Housing Assets*

* Estimated as the share of households in each age group that purchased a housing asset for the first time or increased their housing asset holdings over the given period

** Consists of holiday and other housing (excludes farms and businesses)

Sources: HILDA Release 14.0; RBA

Graph 7
Households Changing Debt*



* Households surveyed in 2010 and 2014

Sources: HILDA Release 14.0; RBA

largest holders of housing assets. Households in New South Wales and Victoria were slightly more likely to increase their holdings of other property than was the case from 2006 to 2010.

Most of these purchases would have been predominantly funded by mortgages, so the distribution of households purchasing housing assets over the period is likely to have influenced the distribution of household debt.

Household Debt

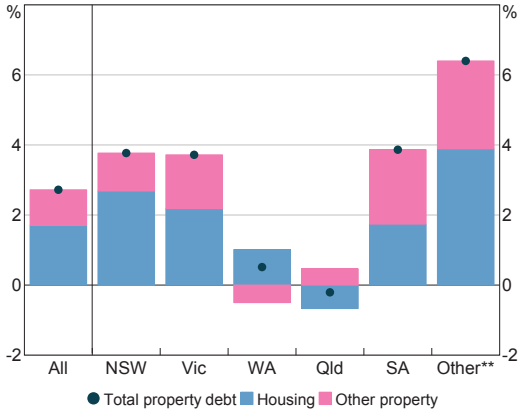
The distribution of debt in Australia is highly skewed. High-income households hold the majority of debt. The top income quintile held almost 50 per cent of the stock of household debt in 2014. Almost a third of households held no debt, with the majority of these being retired households.

Over the four years to 2014, about 40 per cent of households increased their levels of nominal debt, while a similar share of households reduced their holdings of debt (Graph 7). The remaining quarter of households maintained the same, mostly negligible, amount of debt over the period.

As was the case in previous surveys, younger households were more likely to have increased their debt levels than older households. Almost 60 per cent of households aged between 15 and 24 years increased their debt from 2010 to 2014, compared with 6 per cent of those aged 75 years or more. This was likely to have been due to life-cycle effects – young households take on debt to fund their education and purchase property, before paying down the debt over their working lives.

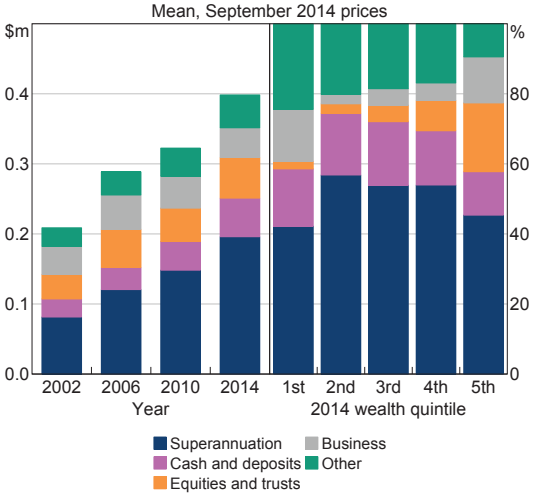
Property debt accounted for a little over 80 per cent of the stock of debt held by households in 2014. Average debt increased modestly from 2010 to 2014, by a little more than 2 per cent per year (Graph 8). Households in Queensland reduced their average level of property debt over the period, while households in Western Australia saw a slight increase and the other states and territories saw much stronger growth in debt. Following households through time shows that a similar proportion of households in each state increased their level of nominal debt between 2010 and 2014. This suggests that, on average, households in New South Wales, Victoria and South Australia took on more debt, or paid off less debt, than households in other states over the period.

Graph 8
Real Growth of Property Debt*
Annualised, by state



* Households surveyed in 2010 and 2014 with positive debt
** Consists of the ACT, NT and Tasmania
Sources: HILDA Release 14.0; RBA

Graph 9
Real Non-housing Assets
Mean, September 2014 prices



Sources: HILDA Release 14.0; RBA

Non-housing Assets

According to the HILDA Survey, the average value of non-housing assets increased by around 3 per cent per annum in real terms from 2010 to 2014. ABS data which are consistent with the national accounts suggest that this growth was around 4 per cent. Both data sources indicate that non-housing asset growth picked up relative to the 2006–10 period, but remained lower than the growth seen between 2002 and 2006.

Tracking the same households over time indicates that the pick-up in growth for non-housing assets was partly due to the recovery of asset values following the 2008–09 period, particularly for assets such as equities and superannuation. Of the 40 per cent of households who reported a decrease in value of these assets from 2006 to 2010, roughly two-thirds reported an increase in value from 2010 to 2014. Around 40 per cent of these households reported an increase in value to a level that exceeded the initial real value of these assets in 2006.

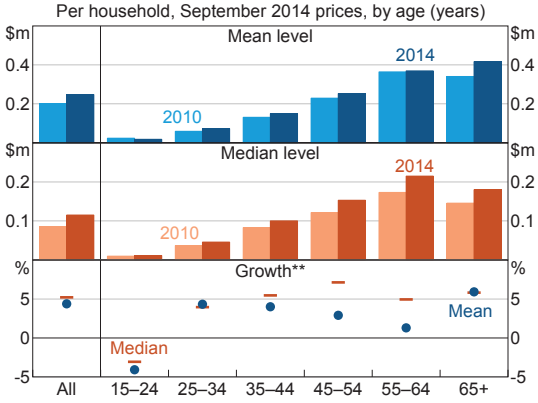
The mean value of real non-housing assets increased from around $320 000 in 2010 to almost $400 000 in 2014 (Graph 9). Overall, non-housing assets accounted for 43 per cent of total household assets in 2014, up from 39 per cent in 2010.

Superannuation accounted for around half of the value of non-housing assets in 2014 and was the second largest asset class in Australian households' balance sheets, after housing. Deposits and direct equity holdings accounted for 14 and 15 per cent of non-housing assets, respectively. Business assets accounted for 11 per cent of non-housing assets and the remainder comprised of other assets such as life insurance and durable goods (including motor vehicles and collectibles). Wealthier households held a higher-than-average share of assets in the form of direct equity holdings and business assets, while households with lower net wealth held more in cash and deposits, superannuation and durable goods (Graph 9).

Most of the increase in non-housing assets between 2010 and 2014 came from growth in superannuation assets. The mean superannuation balance grew by around 4 per cent per annum in real terms for all households over the period to $250 000 in 2014 (Graph 10).[10] The share of

10 See footnote 8 for an explanation of the mean and median statistics used in Graph 10.

Graph 10
Real Superannuation Assets*
Per household, September 2014 prices, by age (years)



* Households surveyed in 2010 and 2014 with positive superannuation
** Annualised percentage change
Sources: HILDA Release 14.0; RBA

households with superannuation holdings also increased from 80 to 84 per cent.

Annual mean growth in superannuation was highest for households over the age of 65 years, which is a pattern that is also seen in the ABS data that are consistent with the national accounts. The fact that retired households' superannuation assets grew, despite these households typically running down superannuation balances, suggests that valuation effects have played a role in the growth of superannuation assets for this age group.

The noticeably stronger growth in median superannuation assets relative to the mean for households aged 45 to 64 years suggests that the 'typical' (or median) household in these age groups are building up superannuation assets faster in the lead-up to retirement than the households in the same age group with the largest balances of superannuation (Graph 10).

Aggregate data from the ABS indicate that real growth in superannuation assets between 2010 and 2014 was due to both positive valuation effects and an increase in new inflows into superannuation assets (i.e. stock effects). Positive valuation effects can be explained in part by stronger average returns of superannuation funds over the 2010–14 period that were helped by the recovery in global equity markets and by a large depreciation of the Australian dollar, which raised the value of investments in overseas assets held by superannuation funds.

New inflows into superannuation assets between 2010 and 2014 were likely to have been boosted by the increase in the minimum employer contribution rate from 9 to 9¼ per cent in July 2013 and by Australian households making fewer, but larger-sized voluntary personal contributions into their superannuation funds. While a lower share of households in the HILDA Survey reported making either a lump sum or salary-sacrificed voluntary contributions in 2014, the average annual value of voluntary contributions into superannuation increased to around $25 000, compared to $19 000 in 2010.

A closer look at retired households suggests that growth in superannuation assets for this cohort has been lifted by the growth in the value of assets held by self-funded retirees, who account for around 25 per cent of retired households over the age of 55 years. Self-funded retirees are households that do not rely on government aged pensions or allowances to support their retirement.[11] Instead, these households typically hold a larger share of assets in superannuation and equities than other retired households, and fund retirement using income generated from these assets. Between 2010 and 2014, superannuation grew at around 9 per cent per annum in real terms for self-funded retirees compared to 4 per cent per annum for other retired households.

11 The ABS defines 'self-funded retiree households' as households whose principal source of income comes from investment or superannuation income, and whose household reference person is not in the labour force (retired) and at least 55 years of age.

Conclusion

Household-level data from the HILDA Survey can be used to examine how wealth changes over time for households in different age and income groups, and in different regions of Australia. Real household wealth increased modestly between 2010 and 2014, although growth remained slower than the pace seen in the first half of the 2000s. The main driver of growth in household wealth over that period was an increase in the value of financial assets, mostly superannuation assets. Weaker growth in housing wealth, with declines in Queensland and Western Australia, contributed to the slower growth in total wealth from 2010–14. Overall, wealth increased most for households in New South Wales and for wealthier, retired households with a larger share of wealth in superannuation and equity assets.

References

ABS (Australian Bureau of Statistics) (2013), 'Information Paper: Australian National Accounts, Distribution of Household Income, Consumption and Wealth 2009–2010', Cat No 5204.0.55.009, Canberra.

Bloxham P and T Betts (2009), 'The Composition and Distribution of Household Wealth in Australia', RBA *Bulletin*, April, pp 5–23.

Finlay R (2012), 'The Distribution of Household Wealth in Australia: Evidence from the 2010 HILDA Survey', RBA *Bulletin*, March, pp 19–27.

Headey B, D Warren and M Wooden (2008), 'The Structure and Distribution of Household Wealth in Australia: Cohort Differences and Retirement Issues', Social Policy Research Paper, No. 33. Available at <https://www.dss.gov.au/sites/default/files/documents/05_2012/sprp33.pdf>.

Kohler M, E Connolly and K Smith (2004), 'The Composition and Distribution of Household Assets and Liabilities: Evidence from the 2002 HILDA Survey', RBA *Bulletin*, April, pp 1–11.

Why Has Retail Inflation Been So Low?

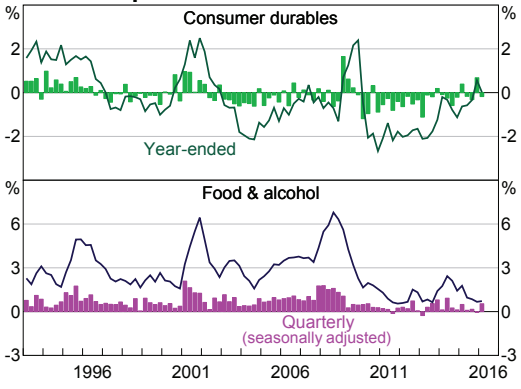
Alexander Ballantyne and Sean Langcake*

Inflation in the price of retail goods has been surprisingly low for a number of years. The considerable depreciation of the Australian dollar over this period by itself would typically have led to higher retail inflation. This article considers whether the direct relationship between the exchange rate and retail inflation has changed, or if other developments in the retail supply chain can account for recent trends in retail inflation. There is little statistical evidence that the relationship between the exchange rate and retail inflation has changed. Discussions with retailers in the Reserve Bank's business liaison program suggest that an intensification of competition in the retail sector and firms' efforts to reduce costs along their supply chain are likely to have contributed to low retail inflation.

Introduction

Retail goods in the consumer price index (CPI) include consumer durable goods, such as clothing, footwear and household appliances, as well as food and alcohol (Graph 1).[1] These items account for around 30 per cent of the total CPI basket and around 60 per cent of tradable items. The prices of tradable items, particularly retail goods, tend to be heavily influenced by the exchange rate as they are either imported or exposed to international competition. Indeed, prior to 2010, retail inflation moved relatively closely with changes in the import-weighted exchange rate (Graph 2). However, since 2010, retail inflation has been lower than expected, given the depreciation of the exchange rate since 2013. This suggests that either the nature of exchange rate pass-through may have changed or other factors have been placing downward pressure on the prices of these items.[2] This article explores potential reasons for this surprising weakness in retail inflation, focussing on the role of exchange rate pass-through and utilising information from the Bank's business liaison program to gain a better understanding of other factors that may be influencing prices in the retail sector.[3]

Graph 1
Components of Retail Inflation*



* Adjusted for the tax changes of 1999–2000
Sources: ABS; RBA

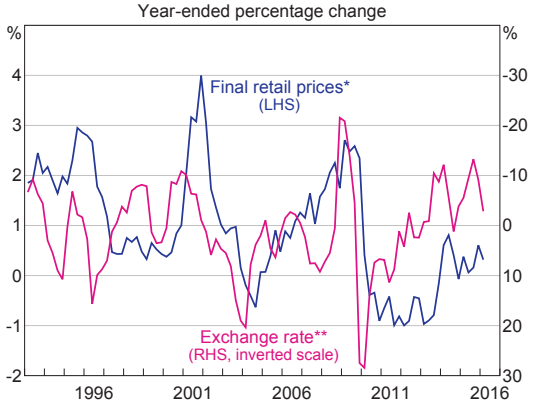
* The authors are from Economic Analysis Department and thank Rosetta Dollman for valuable input to this article.

1 Fruit and vegetables are excluded in this article, as quarterly price movements in these items are especially volatile.

2 For previous discussion of this divergence, see RBA (2013).

3 The Reserve Bank business liaison team conducts around 70–80 discussions with contacts on a monthly basis. Discussions with any individual firm typically occur around every 6 to 12 months. Bank staff usually meet the chief executive officer, chief financial officer and/or operations manager. Liaison meetings are held with firms of all sizes, although most discussions are with mid-sized and large firms where conditions are more likely to reflect economy-wide trends rather than firm-specific factors. For more information, see RBA (2014).

Graph 2
Retail Prices and the Exchange Rate
Year-ended percentage change



* Adjusted for the tax changes of 1999–2000
** Import-weighted index, quarter average
Sources: ABS; RBA

The Cost Structure of Retail Goods

D'Arcy, Norman and Shan (2012) describe a stylised version of the retail supply chain. Goods are produced by manufacturers, either in Australia or overseas, and transported to wholesalers. Wholesalers distribute these goods to retailers; retailers then sell them to consumers.[4]

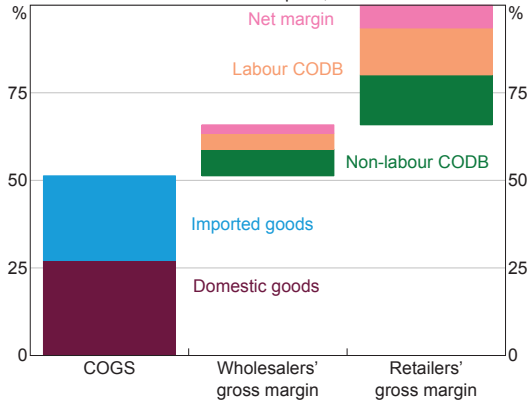
In this stylised process, the cost of getting retail goods to consumers has five major components. The price paid by the wholesaler, inclusive of any transport costs and tariffs, is the wholesaler's 'cost of goods sold' (COGS). The wholesaler incurs operating costs, including expenditure on staff, rent, freight and the cost of holding inventory, known as the wholesaler's 'cost of doing business' (CODB). Additionally, the wholesaler applies a 'net' or profit margin. As with the wholesalers, retailers face a range of operating costs (the retailer's CODB), most significantly labour and rent costs, and charge a net margin. The sum of the wholesaler's or retailer's CODB and net margin is their 'gross margin'. Developments in each of these components have an influence on final retail prices. The magnitude of these costs in the retail supply chain can be estimated by using the Australian Bureau of Statistics' (ABS) input-output tables.

In 2012/13:

- COGS contributed to just over half of the final sale price of retail goods, with this cost roughly equally split between domestically produced and imported goods (Graph 3). Changes in the exchange rate principally affect retail prices through this part of the supply chain (discussed below).
- Wholesalers' gross margins comprised 15 per cent of final sales prices, with just over 2 per cent representing wholesalers' net margins.
- Retailers' gross margins accounted for the remaining 34 per cent of the final sale price, with 6½ per cent retailers' net margins and 13 per cent labour costs.

These contributions have been quite stable through time and are comparable with earlier estimates (D'Arcy *et al* 2012).

Graph 3
Cost Structure of Retail Goods
Share of final sale price, 2012/13



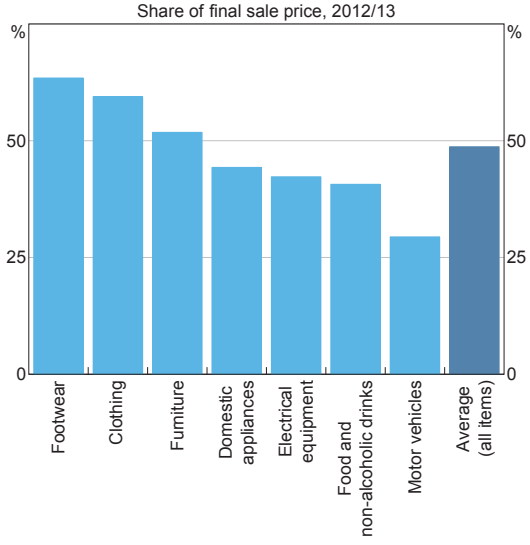
Sources: ABS; RBA

This analysis masks considerable differences in the cost structure of different types of retail goods. Gross margins charged by distributors (wholesalers and retailers taken together) vary across products and are determined by a range of factors, including the extent of competition and the speed with

4 This is a stylised process because in some cases wholesalers may sell directly to consumers, or retailers may bypass wholesalers and directly source goods from manufacturers.

which distributors turn over stock (D'Arcy *et al* 2012; Graph 4). Therefore, changes in key determinants of costs, such as the exchange rate and wages, may have varying effects across products. Nonetheless, it is possible to identify trends across retail goods as a whole, and this framework can be used to examine why retail inflation has been surprisingly low over the past five years or so.

Graph 4
Distributors' Gross Margins by Product Type
Share of final sale price, 2012/13



Sources: ABS; RBA

Has Exchange Rate Pass-through Changed?

The exchange rate has an important influence on the prices of retail items. The cost of imports accounts for one-quarter of the value of retail goods and is typically priced in foreign currencies. As such, movements in the exchange rate will affect the Australian dollar price that importers pay for these items. Over the past few years, the Australian dollar has depreciated by around 20 per cent on an import-weighted basis, which has placed upward pressure on COGS by making imports more expensive in Australian dollar terms. All else equal, a depreciation of the exchange rate also increases foreign demand for domestically produced goods, placing upward pressure on prices for domestically produced traded goods as well.[5] Despite this, retail inflation has remained low, which raises the question of whether pass-through of exchange rate movements into final prices has diminished in recent years.

The divergence between import prices and final prices

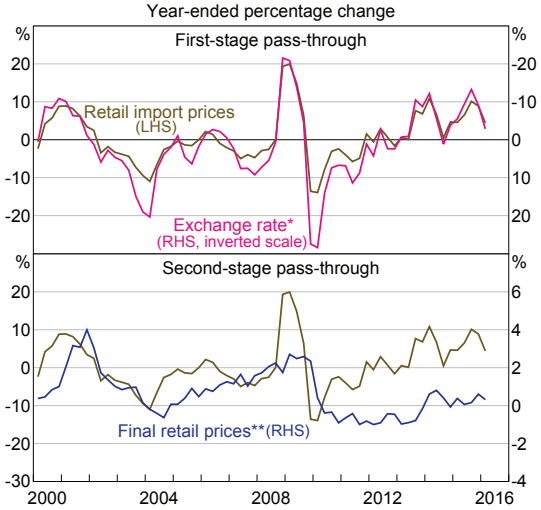
Exchange rate pass-through is usually considered in two stages: from movements in the exchange rate through to the Australian dollar cost of imports (first stage); and from the cost of imports through to final consumer prices (second stage). Since the exchange rate began to depreciate in mid 2013, first-stage pass-through to imports of retail items has been largely consistent with its historical relationship (Graph 5).[6] However, there appears to be a marked divergence between inflation in import prices and final prices for retail goods beginning in 2010.

This divergence may be consistent with a change in second-stage exchange rate pass-through, which would indicate a change in firms' responses to exchange rate movements. However, as discussed above, there is a range of costs other than imported COGS that contribute to retail inflation within the retail supply chain; movements in these costs could also drive the divergence between import and final prices of retail goods. Hence, the relationship between import price inflation and retail inflation should be tested *conditional on movements in the other determinants* to assess whether the divergence is a change in second-stage exchange

5 A depreciation will also increase the (Australian dollar) export prices of domestically produced traded goods (which are priced in foreign currencies), placing upward pressure on the price of these goods in Australia. These goods, such as meat, account for a small share of retail goods and hence upward pressure on retail goods from the depreciation of the exchange rate is mostly due to prices of imports.

6 This is in large part due to a mechanical relationship between import prices and the exchange rate; retail goods imports invoiced in foreign currencies are converted to Australian dollar terms at the current exchange rate when measuring import prices. The data also capture changes in the foreign currency price of retail goods, reflecting price movements driven by international developments unrelated to the exchange rate. Chung, Kohler and Lewis (2011) find that a 10 per cent depreciation in the exchange rate typically results in import prices increasing by around 8 per cent, and that most of this response occurs within the same quarter. These results hold over an extended sample.

Graph 5
Exchange Rate Pass-through
Year-ended percentage change



* Import-weighted index, quarter average
** Adjusted for the tax changes of 1999–2000
Sources: ABS; RBA

rate pass-through or something else. That is, the effects of movements in the exchange rate need to be disentangled from movements in other costs. This can be done by utilising a basic econometric model of retail inflation.

Testing for breaks in the determinants of retail inflation

To assess whether second-stage pass-through has changed, a model is estimated in which retail inflation is explained by: growth in the cost of labour needed to produce a unit of output (unit labour costs (ULCs)); import price inflation; and inflation expectations (see Appendix A for details). Although movements in the exchange rate can have a considerable impact on the final prices of retail goods, they usually take some time to pass through supply chains. To account for this, the model includes several lags of import prices. The inclusion of inflation expectations in the model captures the expected balance of supply and demand conditions. Because ULC growth, import prices, and inflation expectations are affected by international and domestic economic developments, the model should also account for the broader macroeconomic context in which the retail sector operates.

Although the model captures several principal drivers of retail inflation, other potentially important costs identified in the stylised supply chain presented earlier are omitted, such as non-labour CODB and net margins of retailers and wholesalers. Limited data are available on these other costs and are neither timely nor granular enough to provide a clear explanation for the relatively low retail inflation of late. If inflation in these costs is relatively stable over time, then this will be captured by a constant term in the model. However, if these costs change over time, the model will tend to exhibit bias.[7]

This simple model can be used to test for changes in the relationships between the explanatory variables and retail inflation. These tests find no statistical evidence of a change in the coefficients on import prices in late 2010. This suggests that the response of retail inflation to changes in import prices (and hence to the exchange rate) after 2010 are consistent with the relationship prior to that time.[8] In contrast, the tests find evidence of a statistically significant break in late 2010 for the constant term, the coefficients on inflation expectations and ULC growth individually, and for all variables jointly (Table B1).[9]

In summary, the results are consistent with a break in the dynamics of retail inflation in late 2010, but a break at this date is unlikely to be due to a change in exchange rate pass-through.

7 To the extent that any omitted variables are correlated with the explanatory variables included in the regression, the estimates will be biased. It is possible that breaks identified in the modelled relationships could be driven by changes in the relationship between an omitted variable and retail inflation.

8 Quandt-Andrews tests trim a proportion of the data at the beginning and end of the model sample, where there are not enough observations to correctly estimate the test. This means the test sample does not include the period since the exchange rate began to depreciate in 2013. Thus, the tests cannot determine whether the response of retail inflation to the recent depreciation of the exchange rate is consistent with the historical relationship.

9 The *p*-values for each of these tests indicate a less than 1 per cent chance of the observed data being consistent with there being no break at the corresponding date.

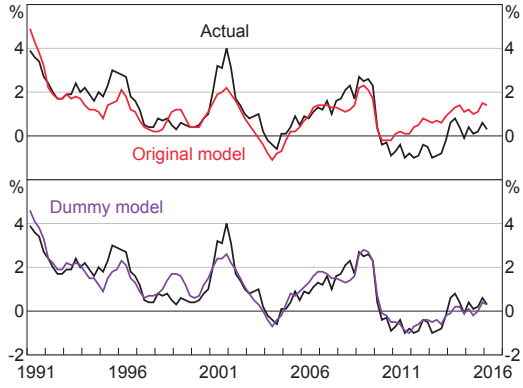
What has changed in retail inflation?

Given that the direct relationship between retail inflation and the exchange rate does not appear to have changed, this raises the question of whether changes in relationships with other variables can explain the lower-than-expected retail inflation outcomes since late 2010. To investigate this, the model of retail inflation is estimated over a shorter sample that ends prior to December quarter 2010 and the results are compared with the same model estimated over the full sample. The difference in the model coefficients estimated over the two samples shows that the response of retail inflation to ULC growth and inflation expectations is broadly similar before and after December quarter 2010 (Table 1). Therefore, although the tests found statistical evidence of a change in the relationships for these variables, the economic significance of this change appears to be small.

In contrast, the coefficient on the constant term, which is the average rate of retail inflation once movements in the other variables have been controlled for, is markedly different over the short sample. In particular, since late 2010 there has been a large downward shift in the average rate of retail inflation that cannot be attributed to inflation expectations, ULC growth or import prices.

A break in the constant term can be remedied by the inclusion of a dummy variable that is equal to 1 from December quarter 2010 onwards, and 0 beforehand. The dummy variable captures the downward shift in retail inflation since late 2010, and markedly improves the fit of the model to the data (Graph 6). The estimated coefficient on the dummy variable is large, suggesting that retail inflation has been more than 1½ percentage points lower in year-ended terms (on average) since the December quarter 2010.[10] This suggests that variables not included in the model – such as domestic COGS, non-labour CODB or net margins – have been weighing on retail inflation, but it does not provide any insight into exactly which they might be. Nor does it imply that their effect on retail inflation will be permanent.

Graph 6
Retail Inflation*
Year-ended



* Adjusted for the tax changes of 1999–2000
Sources: ABS; Authors' calculations

Table 1: Retail Inflation Model Coefficients in Different Specifications[(a)]
Percentage point change in quarterly retail inflation associated with a 1 percentage point change in variable

	Original model[(b)]	Short sample[(c)]	Dummy model[(b)]
Constant	–0.24**	–0.07	–0.06
Inflation expectations	0.12***	0.09***	0.10***
ULC growth[(d)]	0.17**	0.18***	0.15**
Import prices[(d)]	0.18***	0.17***	0.17***
Dummy			–0.39***

(a) ***, ** and * represent statistical significance at the 1, 5 and 10 per cent level, respectively, using Newey-West standard errors
(b) Estimated over 1990:Q1–2016:Q1
(c) Estimated over 1990:Q1–2010:Q3
(d) Coefficients shown are the sum of the lags
Sources: ABS; Authors' calculations

10 The dummy subtracts 0.4 percentage points from quarterly retail inflation, which is over 1½ percentage points annually.

Other Determinants of Retail Prices

Given the limited data on other costs in the retail supply chain, such as changes in the non-labour CODB or wholesale and retail margins, insights from the Banks' business liaison program help to explain potential reasons for lower-than-expected retail goods inflation since 2010.

The cost of goods sold

Discussions with retailers across a range of market segments have confirmed that firms' COGS have increased due to the depreciation of the exchange rate. Nevertheless, there have been some other factors that have contributed to COGS inflation being somewhat weaker than the depreciation of the exchange rate alone would imply.

- Lower global prices for commodities, such as cotton, base metals and oil, have lowered input costs for manufacturers and transportation costs over the past few years.
- Excess industrial capacity has placed downward pressure on manufactured goods prices in China (RBA 2016).
- Some firms have been able to source imported products from lower-cost locations.[11]

Although these developments may be salient at the firm level, it is difficult to identify them in the data. In part, this could be because their effect on COGS is marginal relative to the large changes in the exchange rate over recent years. Retailers have indicated that, in general, they have been unable or unwilling to change their prices to fully reflect COGS inflation, indicating that there are other pressures in the retail sector contributing to low inflation.

Retail competition

Liaison with retailers suggests that over the period of interest, competition in the retail sector has intensified, partly due to increased supply. There are numerous sources of this increase in competitive pressures, although some key themes have emerged from liaison.

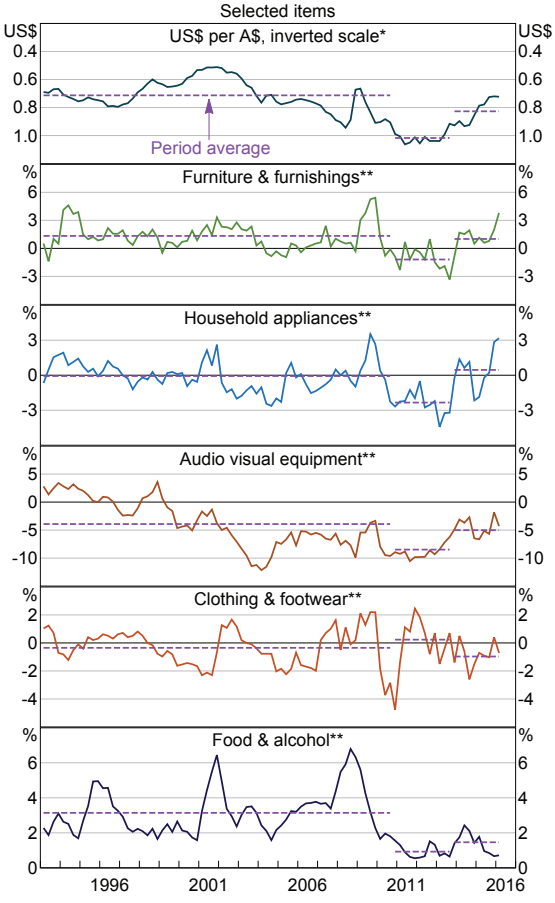
- Technology has enabled consumers to compare retail prices quickly and easily online and determine which retailer(s) are offering the lowest prices. The increasing online presence of traditional bricks-and-mortar retailers is contributing to this effect.
- Relatedly, the supply of retailers has increased due to competition from foreign online retailers. This was particularly evident over 2010–13 when the exchange rate was relatively high (Graph 7). Over this period, domestic retailers became relatively less competitive against competitors based offshore.
- Both established firms and new entrants, including international retailers entering the Australian market, are competing aggressively to gain market share.

In a number of market segments, liaison has attributed the increase in retail competition to the actions of a perceived 'market leader', which is generally looking to expand their market share, effectively increasing supply. This has led a number of retailers to report that they believe demand for their goods is very price sensitive, and fear that they will lose sales volumes if they increase prices. Earlier work on Australian retailers found that a majority of firms primarily set prices based on the balance of supply and demand factors, such as market conditions or competitors' prices, rather than setting prices as a fixed mark-up over costs (Park, Rayner and D'Arcy 2010).

Most market segments experienced lower inflation from 2010 (Graph 7). The identification of a break in retail inflation in late 2010 coincides with the timing of the Australian dollar reaching parity with the US dollar. Liaison suggests that competition from foreign sources was particularly pronounced at that time, possibly due to the ease with which domestic and foreign price differentials could be calculated. Since 2013, inflation has increased somewhat in most market segments, broadly consistent with

11 Distributors' hedging cover has also helped delay the exchange rate effect on COGS, although this is a transitory effect that only mitigates the timing of COGS inflation, and not the magnitude.

Graph 7
The Australian Dollar and Retail Inflation
Selected items



* Quarter average
** Year-ended, adjusted for the tax changes of 1999–2000
Sources: ABS; Bloomberg; RBA

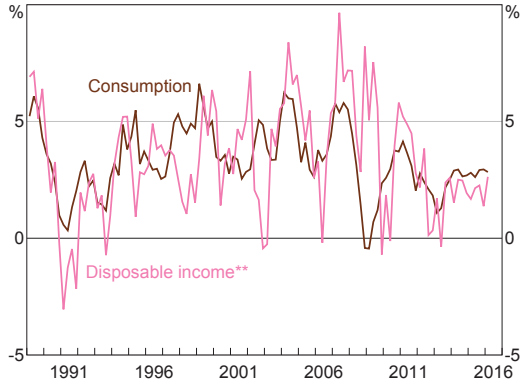
the exchange rate depreciation. However, the data indicate that the apparel sector is a clear exception. Liaison suggests that competition for market share between established firms and new foreign entrants has been particularly strong in this segment. The data suggest that the effect of competitive pressures is likely to have restrained price inflation, despite rising COGS.

Evolving business practices

Heightened retail competition and the depreciation of the exchange rate appear to have contributed to a situation whereby COGS inflation is higher than retail goods inflation. This implies a compression of distributors' gross margins. To maintain profitability, retailers have had to adapt some of their business practices.

Some larger firms have lowered margins on each product, but are selling higher volumes. This allows firms to defray fixed costs and achieve greater economies of scale. This competitive pressure to reduce margins in order to try to gain market share has occurred over a period in which consumer demand has been relatively subdued, in part due to weak income growth, making it more difficult for firms to increase sales volumes (Graph 8).

Graph 8
Real Household Income and Consumption*
Year-ended percentage change



* Household sector includes unincorporated enterprises
** Disposable income is after tax and interest payments; income level smoothed with a two-quarter moving average between March quarter 2000 and March quarter 2002
Sources: ABS; RBA

Liaison with retailers has also highlighted renewed efforts by firms to find efficiencies to reduce their CODB. Labour costs are around half of retailers' CODB. Retailers have sought labour productivity gains through technological improvements, such as contactless payments systems, self-serve checkouts and better monitoring of staffing needs. Firms have also sought to lower their CODB by other means, such as bargaining for lower rents, improving inventory management, sourcing from fewer suppliers, partnering with other firms to lower distribution costs and centralising some administration tasks.

Conclusion

Retail inflation has been surprisingly weak for a number of years. There is little evidence of a change in the direct relationship between the exchange rate and retail prices, and liaison with retailers suggests that the cost of goods sold has indeed increased due to the depreciation of the exchange rate since 2013. Rather, retail inflation appears to have been constrained by a range of other developments in the retail supply chain. Intensification in retail competition, in part driven by foreign entrants, has compressed gross margins, and firms have sought cost reductions, including through labour productivity gains, to maintain profitability. These persistent developments appear to have gone some way to offsetting the rising cost of goods sold due to the exchange rate depreciation in recent years.

Appendix A

The model of retail inflation is a distributed lag model based on an expectations-augmented mark-up framework of consumer prices (for details, see Norman and Richards (2010)). The mark-up framework considers consumer prices as a proportional mark-up over costs, including unit labour costs and import prices to reflect input costs. The basic specification used in this article is:

$$\pi_t^r = \alpha_0 + \alpha_1 \pi_{t-1}^e + \sum_{i=1}^{5} \alpha_{2,i} \Delta ulc_{t-i} + \sum_{j=1}^{8} \alpha_{3,j} \Delta mp_{t-j} + \mu_t \quad \text{(A1)}$$

where π_t^r is quarterly retail inflation, α_0 is the constant term, π^e is inflation expectations as measured by the break-even rate on indexed bond yields for a constant 10-year maturity, *ulc* is unit labour costs (in log form), *mp* is import prices (in log form) and μ is an error term.

Appendix B

Table B1: Retail Inflation Model
Quandt-Andrews tests[a]

	Maximum Wald F-statistic	Corresponding p-value	Corresponding date
All variables	47.9	0.001	2010:Q3
Constant	36.6	0.000	2010:Q4
Inflation expectations	37.5	0.000	2010:Q4
ULC growth[b]	27.1	0.002	2010:Q4
Import prices[b]	14.4	0.538	2010:Q3

(a) Model sample 1990:Q1–2016:Q1; test sample 1994:Q1–2012:Q1 (i.e. 15 per cent sample trimming)
(b) All lags of variable jointly
Sources: ABS; Authors' calculations

References

Chung E, M Kohler and C Lewis (2011), 'The Exchange Rate and Consumer Prices', RBA *Bulletin*, September, pp 9–16.

D'Arcy P, D Norman and S Shan (2012), 'Costs and Margins in the Retail Supply Chain', RBA *Bulletin*, June, pp 13–22.

Norman D and A Richards (2010), 'Modelling Inflation in Australia', RBA Research Discussion Paper No 2010-03.

Park A, V Rayner and P D'Arcy (2010), 'Price-setting Behaviour – Insights from Australian Firms', RBA *Bulletin*, June, pp 7–14.

RBA (Reserve Bank of Australia) (2013), 'Box B: The Recent Deflation in Consumer Durables Prices', *Statement on Monetary Policy*, May, pp 57–59.

RBA (2014), 'The RBA's Business Liaison Program', RBA *Bulletin*, September, pp 1–5.

RBA (2016), 'Box A: Recent Trends in Inflation in China', *Statement on Monetary Policy*, February, pp 14–16.

The Growth of Apartment Construction in Australia

Michael Shoory*

Apartments have become an increasingly important contributor to new dwelling construction over recent years and in 2015 accounted for more than one-third of all residential building approvals. The majority of recent apartment construction has been located in Sydney, Melbourne and Brisbane. Across these cities there have been differences in geographical concentration, the types of buyers purchasing the dwellings and supply-side factors such as planning frameworks. The increase in apartment construction has reflected a range of factors, including the nature of land supply constraints and affordability considerations, together with a desire to reside in close proximity to employment centres and amenities. Given that these factors are likely to persist, apartments are expected to continue to play an important role in providing new housing supply.

Introduction

The number of residential houses and apartments built each year in Australia cycled around a flat trend over the 15 years to 2009. Since then, total residential building approvals have increased noticeably. High-density apartments have accounted for most of this increase, such that, by 2015, apartments accounted for one-third of all residential building approvals. This strong volume of apartment construction has made a significant contribution to economic growth and employment.

The majority of the new apartments have been built in the most populous cities and primarily near inner-city areas or close to transport infrastructure. The increase in apartment construction has delivered many dwellings that are less expensive than larger, lower-density housing. They are mostly in areas that are well connected with amenities and employment centres.

This article discusses recent activity in apartment construction, the different characteristics that have emerged in markets across the larger capital cities and the factors that have increased apartments as a share of the housing stock. The main focus of this article is on Sydney, Melbourne and Brisbane, given that these three cities have accounted for more than three-quarters of apartment approvals since 2011. As part of its business liaison program, the Reserve Bank meets regularly with a wide range of apartment developers, state and local government agencies and housing industry associations across the country; the information gathered during liaison has helped inform this article.[1]

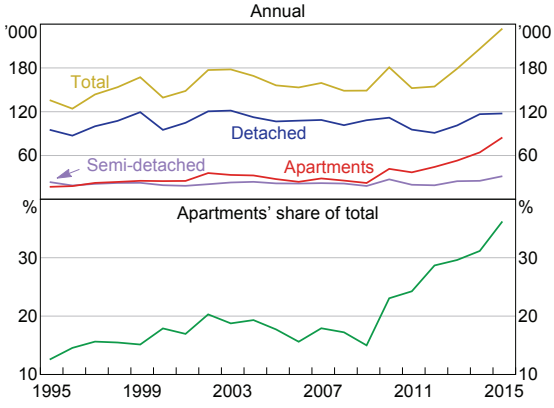
* The author is from Economic Analysis Department.

Recent Activity

After remaining steady for an extended period, apartment construction increased strongly from 2009 onwards (Graph 1). This increase has been concentrated in Australia's three most populous

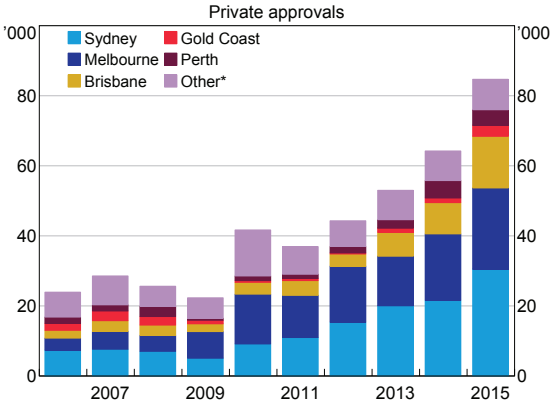
1 The Reserve Bank business liaison team conducts around 70–80 discussions monthly with different contacts. Discussions with any individual firm typically occur around every 6 to 12 months, with Bank staff usually meeting the chief executive officer, chief financial officer and/or operations manager. Liaison meetings are held nationally with firms of all sizes, although most discussions are with mid-sized and large firms, where conditions are somewhat more likely to reflect economy-wide trends rather than firm-specific factors. For more information, see RBA (2014).

Graph 1
Residential Building Approvals



Sources: ABS; RBA

Graph 2
Apartment Building Approvals



* Includes public approvals for all locations
Sources: ABS; RBA

capital cities – Sydney, Melbourne and Brisbane. Initially, approvals for apartments increased in Melbourne in 2010, followed by Sydney, and then Brisbane more recently (Graph 2). Apartment approvals in Perth also increased in recent years, but from a relatively small base. The effect of this increase on the stock of apartments in each city has varied. Cumulative approvals since 2011 in Melbourne and Brisbane have added around one-third to the stock of apartments in those cities compared with an addition of around one-fifth of the 2011 stock for Sydney and Perth (Table 1).

The location of activity within each of the cities has varied. This has been determined by a variety of factors, including proximity to employment centres and transport infrastructure, planning frameworks and the availability of suitable sites for apartment projects. In Sydney, approvals have been relatively spread out across the inner and middle suburbs – a large area ranging from Parramatta in the west to Chatswood in the north and Mascot in the south (Graph 3). In contrast, a relatively large share of apartment approvals in Melbourne has been in the city (which includes the CBD, Southbank and Docklands – an area of around 30 square kilometres), although construction activity in the middle-ring suburbs has picked up more recently. In Brisbane, activity has been concentrated in the city and in a few of the surrounding inner suburbs, as has been the case in Perth.

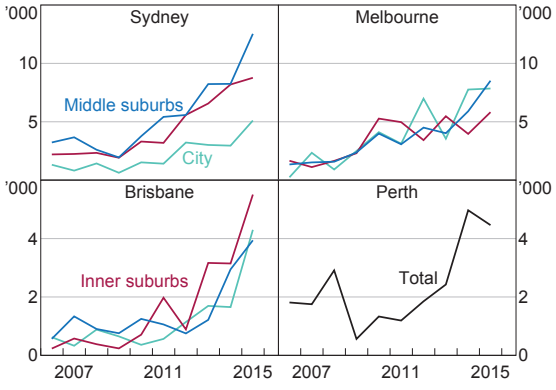
Alongside this strong construction activity, competition among developers for suitable sites for apartment projects has intensified and led to increases in site prices. Australian developers

Table 1: Apartment Building Approvals
City, inner and middle suburbs

	Apartment stock	Building approvals	
	As at September 2011	Total: 2012 to 2015	
	'000	'000	Per cent of 2011 stock
Sydney	434	78	18
Melbourne	224	68	30
Brisbane	83	30	36
Perth[(a)]	71	14	20

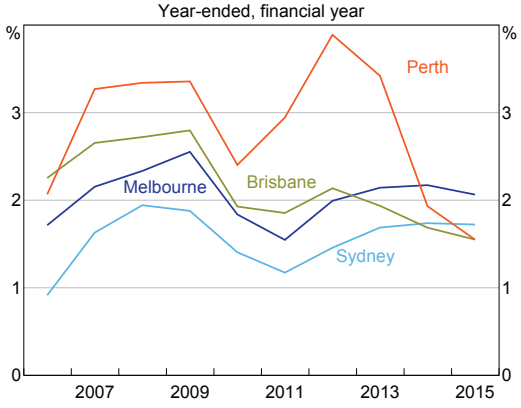
(a) Includes outer suburbs
Sources: ABS; RBA

Graph 3
Apartment Building Approvals*
Annual



* Private approvals
Sources: ABS; RBA

Graph 4
Population Growth by City*
Year-ended, financial year



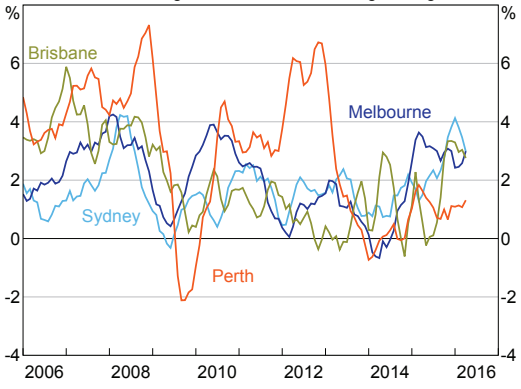
* Greater capital city statistical area
Sources: ABS; RBA

account for the majority of apartment projects, though foreign developers have become more active in acquiring sites and developing projects, mostly in Melbourne and Sydney.[2] In addition to competing over the acquisition of suitable new sites and residential land, developers have also sought to purchase lower-grade office and industrial buildings for conversion into apartment projects, thereby supporting prices for these assets.

Buyers of Apartments

There are a variety of factors that have contributed to increased demand for new apartments from prospective owners and tenants. Employment opportunities and population growth are fundamental drivers of demand for new housing; sustained population growth in Australia's largest cities has led to increased demand for all dwellings, including apartments (Graph 4 and Graph 5). Population growth was strongest in Perth for much of the past decade, in part owing to migration associated with the mining investment boom. That growth has slowed over the past couple of years.

Graph 5
Employment Growth by City*
Year-ended growth of 3-month moving average



* Greater capital city statistical area
Sources: ABS; RBA

In the eastern cities, land supply constraints have led to increased prices for blocks of land and detached houses. This is likely to have driven demand for apartments relative to other dwellings, as apartments use land more intensively than detached houses and are therefore relatively more affordable. A desire to reside close to CBD employment centres is also likely to have stimulated demand for apartments, as residents in increasingly populated cities value the convenience and reduced travel time associated with the proximity to amenities in these areas.

2 Foreign investment in Australian residential dwellings and commercial property (from both buyers seeking dwellings and developers intending to construct projects) has increased in recent years. See RBA (2016) for a description of Chinese investment in Australian property and a discussion of the potential implications for financial stability.

Three types of buyers can be distinguished – owner-occupiers, domestic investors and foreign buyers ('non-residents').[3] Liaison with industry contacts suggests that, in recent years, the relative importance of these three groups has varied across different cities. Foreign buyers have played a relatively significant role in the inner city of Melbourne. In the inner suburbs of Brisbane, domestic investors (particularly from interstate) have underpinned demand, driven in part by the higher yields available relative to Sydney and Melbourne. In contrast, sales in Sydney have been more evenly spread across the three groups of buyers.

Whether buyers are owner-occupiers or investors can influence the composition of the net supply of housing. Purchases of new apartments by domestic investors are most likely to lead to an increase in the supply of rental properties. For owner-occupiers, the net effect will depend on the location and size of the existing property from which the purchaser is moving and whether there is a change in the rate of household formation. For example, if the owner-occupier is a first home buyer moving out of their parents' home, total demand for housing increases alongside the increased supply of housing, whereas if they are moving from a rented property this will create a rental vacancy elsewhere. Similarly, owner-occupiers who are downsizing will leave an established property that can possibly accommodate a larger household. The net impact from foreign buyers on housing demand will depend on the relative mix of those buyers who plan to occupy their dwelling (or leave it vacant) and those who plan to rent out their property.

Industry contacts have often reported that many foreign buyers, especially those who reside in East Asia, have additional motivations for buying apartments in Australia. It is commonly reported that foreign buyers purchase Australian property to diversify their wealth and intend to hold the property for a long period. Contacts also suggest that foreign buyers' motivations can include the prospect of future migration, providing housing for children while they study in Australia, or acquiring holiday apartments. The interest from foreign buyers of property, particularly those from Asia, is not unique to Australia; such buyers are also active in the property markets in other countries, such as the United States, the United Kingdom, Canada and New Zealand. Other features that have been cited as attracting foreign buyers include the lower prices of apartments in Australia in recent years relative to major cities in some other countries (particularly following the depreciation of the Australian dollar), geographic proximity to Asia and a stable political and regulatory environment.

Supply-side Factors

There are several factors that have affected how apartment supply has responded to increased demand over recent years. Liaison with industry contacts suggests that the most significant supply-side factors for new apartment construction are the time and complexity associated with obtaining approval to develop a project, and the availability of suitable sites.[4] The nature of these factors has also varied across the larger capital cities.

There are a number of stages involved in constructing an apartment project, lasting several years from the initial selection of a site to the completion of the project (Table 2). After purchasing a site, a developer must submit a development application (DA) to the relevant authority (normally a state government planning department or a local council). That authority assesses the application in

3 All foreign buyers, other than temporary residents, are generally restricted to purchasing newly constructed dwellings. The observations on foreign buyer activity in this article are sourced from liaison with property developers and other industry contacts. Developers must record the residency of buyers to ensure that they do not exceed Australian banks' caps on pre-sales to foreign buyers (if funded by an Australian lender). Non-residents and temporary residents must apply to purchase Australian property – the Foreign Investment Review Board records data on approvals for these purchases, though these data are limited and partial. For a detailed discussion of the data limitations, see Gauder, Houssard and Orsmond (2014) and RBA (2016).

4 See Hsieh, Norman and Orsmond (2012) for a detailed description of supply factors in the housing sector.

Table 2: Stages of an Apartment Project

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Pre-DA: Site selection, design and prepare DA	DA: Authority assesses DA for approval (may involve community input, appeals, DA amendments, zoning changes)	Financing and marketing: advertise dwellings, secure pre-sales and financing	BA: Receive permit to proceed with construction (building approval generally recorded by ABS)	Construction	Settlement (owners or tenants can occupy apartments)

Source: various liaison contacts

the context of zoning regulations and community input. If approved, the developer will typically then market the project and seek to achieve a given share of off-the-plan apartment sales ('pre-sales') required to secure financing. A permit to commence construction – the building approval (BA) – is then provided by the relevant authority and, finally, construction takes place.[5]

The DA approval process differs across cities and influences the number and scale of apartment projects, and the speed with which new supply responds to demand. Liaison with industry contacts suggests that a more centralised approvals framework, such as where the state government planning department is responsible for assessing the DA, generally facilitates a quicker response compared with situations where local councils make the decision.

A centralised process is sometimes applicable in cases of large or high-value projects. For instance, the Victorian Minister for Planning is responsible for assessing projects in the City of Melbourne with a floor space exceeding 25 000 square metres. Industry contacts have reported that this has contributed to the strong increase of building activity in inner-city Melbourne, with this approach applying to a large proportion of apartment projects commenced in recent years. In Sydney, a centralised framework applies to a smaller share of projects – the New South Wales Minister for Planning generally only assesses projects located in designated large-scale urban renewal sites (Barangaroo, for example). The process in Brisbane is largely centralised, where the Brisbane City Council has been responsible for approving most large projects over recent years. The Brisbane City Council also applies a streamlined framework – 'code assessment' – to many large high-rise projects. Under this framework, DAs that comply with the relevant development and planning codes (such as land-use zones and maximum heights) can be assessed without requiring specific community consultation, potentially shortening the approvals process significantly. By comparison, industry contacts have generally reported that in areas where the framework is more decentralised, such as the inner and middle suburbs of Sydney and Melbourne, the approvals process is often longer and the supply response more gradual.

Zoning regulations also affect the approvals process, particularly outside CBDs. Generally, DAs cannot be assessed if they do not comply with the existing land-use zones set by councils. In these cases, the developer must apply to have the zone changed, which is often a lengthy and costly process. Zoning restrictions also affect the availability and pricing of sites because projects located on sites that are already zoned appropriately for apartment developments can be approved more easily.

5 The ABS generally records a building approval once a construction permit has been granted.

Financing Arrangements

Most developers rely on some form of intermediated financing to ensure projects progress through to the end of the construction phase. While some developers will fund projects entirely with equity, a typical developer will seek bank finance for at least half of the total cost of construction and they will possibly source mezzanine finance to reduce the equity component required.[6] As mentioned earlier, banks impose pre-sales requirements on developers before funding is made available; these requirements vary by market and lender, though generally now cover at least the value of the debt being sought. Australian banks also typically cap the share of a developer's pre-sales that can be accounted for by non-residents, generally at between one-fifth and one-third of the value of debt obtained. Equity-funded developers will also often seek a large share of pre-sales before proceeding with construction, particularly for larger projects. Foreign developers appear to follow a similar model to domestic developers, although some of their bank funding comes from banks resident in their home country, including the Australian branches of foreign banks. Although Australian-owned banks do lend to foreign developers, this is generally to long-standing customers or occasionally taking the lead on syndicated deals in which foreign banks provide a larger share of the funding or take the first exposure to credit losses.

When an individual buys an apartment off the plan (i.e. signs a contract to purchase and provide a deposit, which is usually 10 per cent of the sale price), they may seek pre-approval from their financial institution for debt financing. However, the financial institution does not formally assess debt serviceability or provide unconditional financing approval until settlement is ready to take place. The lender will typically use an estimated valuation for the property to determine the amount of debt that it will provide to the borrower. These financing arrangements typically will be finalised at the time of completion of the development, which is often two to three years after the initial agreement to purchase. If the amount the lender is willing to lend is significantly less than the purchaser expected when they entered into the off-the-plan contract, the purchaser may be unable or unwilling to settle, in which case they would be liable to forfeit their deposit. This settlement risk is magnified if prices (for similar apartments) have declined over the development period (leading to valuation below the purchase price) or if the buyer's financial position has deteriorated (in the event of unemployment, for example). Instances of buyers failing to settle their apartment purchase – settlement failures – can affect the financial position and credit risk of apartment developers, leading to potential losses for lenders.

Financing arrangements and loan-to-valuation ratios (LVRs) vary among different types of buyers. For instance, downsizers and other existing home owners will typically provide more equity than first home buyers and, as such, require a smaller proportion of debt financing from a bank. Lenders also tend to impose lower LVR limits on investors than on owner-occupiers, which means that investors must provide relatively more equity. It is often reported that foreign buyers of apartments in Australia typically finance their purchase with more equity than domestic buyers. Australian-owned banks have traditionally engaged in some lending to non-residents to purchase Australian apartments, but the amounts have been small relative to their total mortgage books. Australian-owned banks also applied tighter lending standards to non-residents than domestic borrowers because it was more difficult to verify the income and other details of foreign buyers, and the banks may have less recourse to these borrowers' assets in the event of default. Australian branches of foreign-owned banks are known to extend financing to foreign buyers, particularly to those from the same resident country.

6 Mezzanine finance is debt that is subordinated to that provided by the bank or senior lender, but ranks ahead of the equity provided by the developer in the event of default.

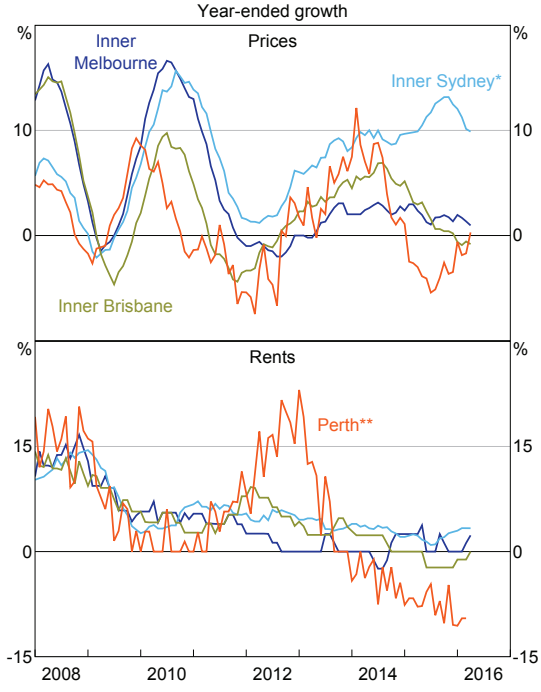
Current Market Conditions

Liaison with industry contacts suggests that demand for new apartments generally remains strong, but appears to have eased in some markets over recent quarters. This has primarily reflected weaker demand by domestic investors, together with tighter lending standards on mortgages implemented by financial institutions and a moderation of expectations for price increases. Sales to foreign buyers (particularly in Sydney and Melbourne) have reportedly remained at a high level. Reports from liaison suggest that demand for apartments has weakened the most in Perth, consistent with the slowing of economic activity and decline in population growth in Western Australia.

Australian-owned lending institutions have reportedly tightened financing conditions for both developers of apartment projects and buyers of apartments. This tightening has been ongoing for some time as banks have sought to control the risk of their exposure to the sector, particularly in areas where there is a sizeable pipeline of supply, and comply with supervisory actions introduced from late 2014. More recently, the large Australian banks have also tightened or ceased lending to foreign buyers seeking mortgages. Despite tightened financing conditions for buyers, developers and financial institutions have both reported that instances in which purchasers of off-the-plan apartments have failed to settle their purchase remain uncommon to date.

Measured prices and rents for apartments in Sydney and Melbourne have either grown or remained relatively stable for much of this decade, despite large additions to supply in these markets (Graph 6). Prices and rents in Sydney have shown the strongest growth, which is consistent with the smaller volume of new apartments (built, in progress or planned) relative to the existing stock. In contrast, Perth has recorded notable declines in prices and rents in recent years, alongside a weakening local economy. More recently, growth in rents and prices has also weakened somewhat in Brisbane.

Graph 6
Median Apartment Prices and Rents
Year-ended growth



* Average of inner-city, inner-south, inner-west, inner-south-west and eastern suburbs
** Metropolitan Perth; hedonic index for prices
Sources: CoreLogic RP Data; RBA

Conclusion

Apartments have driven the increase in new dwelling construction in Australia since 2010 and have provided an important contribution to economic growth and employment. The increase in apartment construction has reflected a range of factors, including land supply constraints, affordability considerations and a desire to reside in close proximity to established amenities and employment centres. This has delivered many new dwellings to the market, which has had an effect on housing prices and rents, with growth in these indicators slowing of late. The majority of recent activity has been located in areas with existing links to transport, infrastructure and services, particularly the inner suburbs of Sydney, Melbourne and Brisbane, and, to a lesser degree, Perth. The increase in apartment construction in these cities has been

characterised by differences in the geographical concentration of activity, the proportional increase in the apartment stock, the types of buyers purchasing the new dwellings and the planning frameworks, which can affect the behaviour of developers and the supply response. Apartments are likely to continue to play an important role in providing new housing as land supply constraints motivate prospective home owners to purchase higher-density dwellings (which use land more intensively and are therefore less expensive relative to larger, lower-density houses), and as tenants and residents choose to live closer to employment centres and amenities for convenience.

References

Gauder M, C Houssard and D Orsmond (2014), 'Foreign Investment in Residential Real Estate', RBA *Bulletin*, June, pp 11–18.

Hsieh W, D Norman and D Orsmond (2012), 'Supply-side Issues in the Housing Sector', RBA *Bulletin,* September, pp 11–19.

RBA (Reserve Bank of Australia) (2014), 'The RBA's Business Liaison Program', RBA *Bulletin,* September, pp 1–5.

RBA (2016), 'Box B: Chinese Demand for Australian Property', *Financial Stability Review,* April, pp 30–32.

Conditions in the Manufacturing Sector

Sean Langcake*

Manufacturing output and employment have fallen steadily as a share of the Australian economy for the past three decades. This article looks at the composition of the sector and draws on the Reserve Bank's liaison with manufacturers to provide an insight into some of their responses to the structural challenges in recent years. According to liaison, the increase in the supply of manufactured goods from low-cost sources abroad, exacerbated by the appreciation of the Australian dollar during the period of rising commodity prices, impaired the viability of many domestic manufacturers and precipitated the closure of some manufacturing production over the past decade. While the recent exchange rate depreciation has helped to improve competitiveness of Australian producers, so far there is only limited evidence of a recovery in manufacturing output and investment.

Introduction

The manufacturing sector in Australia has been on a relatively steady decline as a share of the overall economy for at least the past 30 years. It currently accounts for around 7 per cent of total output and employment. Over that period, domestic manufacturers have faced strong competition from an increase in supply from lower-cost economies, most notably China. Furthermore, over the 2000s, strong Asian demand for Australian commodities led to a sharp increase in the terms of trade and an appreciation of the Australian dollar. The high level of the exchange rate placed additional competitive pressure on manufacturers, adding to the pressures for structural change within the sector. This article draws on the Reserve Bank's business liaison program to illustrate the major challenges facing the sector and how manufacturers are responding.[1]

* The author is from Economic Analysis Department.

1 The Reserve Bank business liaison team conducts around 70–80 discussions with contacts on a monthly basis. Discussions with any individual firm typically occur around every 6 to 12 months. Bank staff usually meet the chief executive officer, chief financial officer and/or operations manager. Liaison meetings are held with firms of all sizes, although most discussions are with mid-sized and large firms where conditions are more likely to reflect economy-wide trends rather than firm-specific factors. For more information, see RBA (2014).

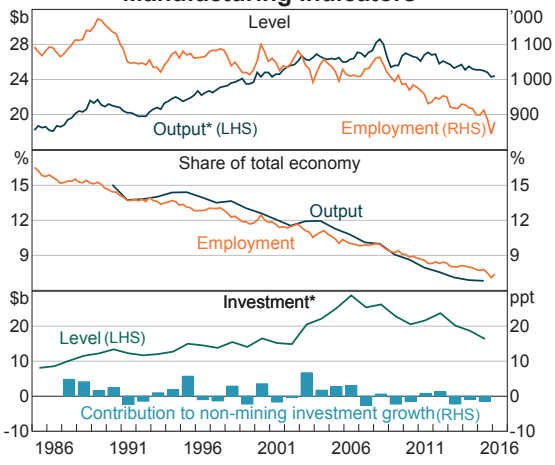
Manufacturing in Australia

Manufacturing output increased steadily throughout most of the 1990s before plateauing in the early 2000s; output today is around the same level it was just over a decade ago (Graph 1). Over the past two decades, the Australian economy as a whole has grown considerably, resulting in a marked decline in manufacturing output as a share of total output. Employment in manufacturing has also declined over the past two decades, with growth in labour productivity in line with that of the economy as a whole. While these trends have been evident for several decades, the period after the global financial crisis has been characterised by relatively slow growth of global industrial production, a more pronounced easing in output growth and fall in employment in the sector.

In line with these trends, investment in the manufacturing sector has also fallen steadily since its peak in 2005/06 (Graph 1). Survey measures and liaison suggest investment will fall further in the coming year.[2] The decline in the manufacturing

2 The Australian Bureau of Statistics' (ABS) capital expenditure survey excludes investment in intellectual property, which has been growing at a faster pace than aggregate manufacturing investment for some time.

Graph 1
Manufacturing Indicators

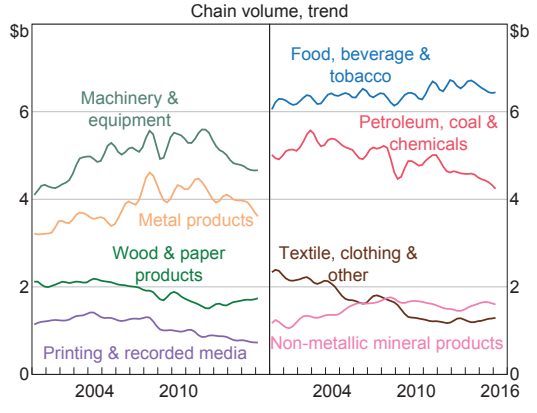


* Chain volume
Sources: ABS; RBA

sector's investment in machinery & equipment and non-dwelling construction has contributed to the recent weakness in private business investment (Kent 2014).

Australia's manufacturing sector is quite diverse and is comprised of several sub-industries, the largest being: food, beverage & tobacco; machinery & equipment; petroleum, coal & chemicals; and metal products (Graph 2). Together, these sub-industries account for around 80 per cent of manufacturing output and employment.

Graph 2
Manufacturing Output
Chain volume, trend



Sources: ABS; RBA

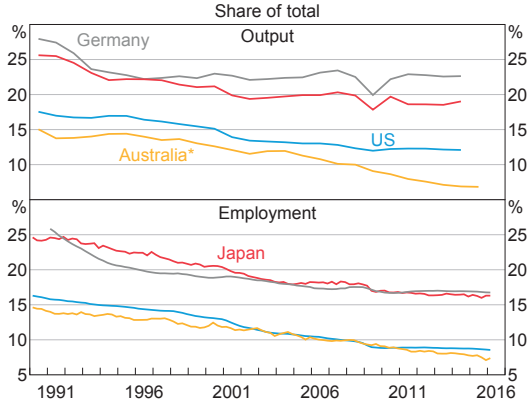
The ABS's input-output tables provide some insight into the structure of these sub-industries (Table 1). Among the four major sub-industries, two broad industry types emerge.

- The food, beverage & tobacco and metal products sub-industries both rely heavily on inputs from primary industries (agriculture and mining) where Australia has an abundant supply, and use a relatively low share of intermediate components that are imported. They also have lower-than-average exposure to competition from imports and tend to export more than other manufacturing sub-industries.
- Conversely, the machinery & equipment and petroleum, coal & chemicals sub-industries use relatively few inputs from primary industries in Australia and have a relatively high share of imported intermediate components. They are exposed to strong competition from imports and their final goods are geared primarily to the domestic market.

The International Context

The trends in Australian manufacturing output and employment are not unique. Over the past 25 years, most advanced economies have seen their manufacturing sectors recede as a share of both output and employment, although Australia has generally had a lower share than many other advanced economies (Graph 3).

Graph 3
Manufacturing Output and Employment
Share of total



* Output data are in financial years
Sources: ABS; RBA; Thomson Reuters; United Nations

Table 1: Characteristics of Australian Manufacturing
By largest sub-industries, 2012/13, per cent

	Food, beverage & tobacco	Metal products	Machinery & equipment	Petroleum, coal & chemicals	Total manufacturing
Share of manufacturing gross value added	25	16	21	17	
Share of manufacturing employment	25	15	23	11	
Domestic primary industry share of intermediate input	38	50	0	13	**27**
Imported share of intermediate input	8	17	33	45	**22**
Import penetration	16	17	65	47	**40**
Export share of supply	17	35	5	9	**13**
Value-added share of production	29	20	37	27	**29**

Sources: ABS; RBA

The ratio of value added to total production in the Australian manufacturing sector is broadly comparable to that in other advanced economies' manufacturing industries (Table 2). Relative to other Australian industries, manufacturing is a low value-added sector; the ratio of value-added to total production (29 per cent) is the lowest of any industry.

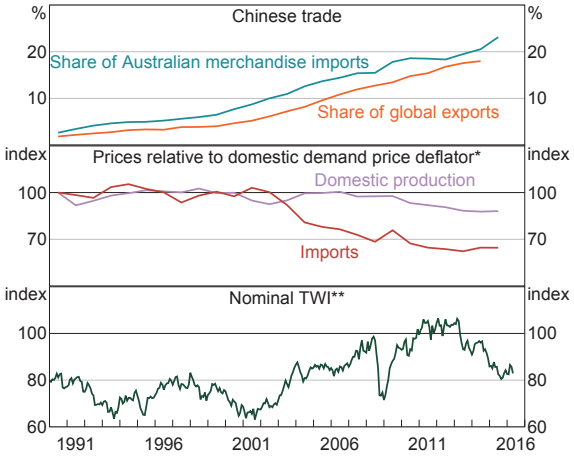
The observed trends in manufacturing output and employment in the advanced economies have been associated with the rise of competition from new sources. The most notable is China, which has increased its share of global manufacturing value-added from under 4 per cent in 1990 to just under 20 per cent in 2010, and increased its share of global exports of manufactured goods to around 18 per cent (OECD 2015; Graph 4). The steady increase in China's share of Australia's merchandise imports has coincided with a fall in the prices of imported manufactured goods relative to domestic production (Graph 4).

Table 2: Manufacturing Value-added Share of Production
2011, per cent

US	35
UK	35
Japan	31
Germany	30
Australia[(a)]	**29**
Canada	29
China	21

(a) 2012/13
Sources: ABS, European Commission; RBA

Graph 4
Manufactured Goods – Trade and Prices

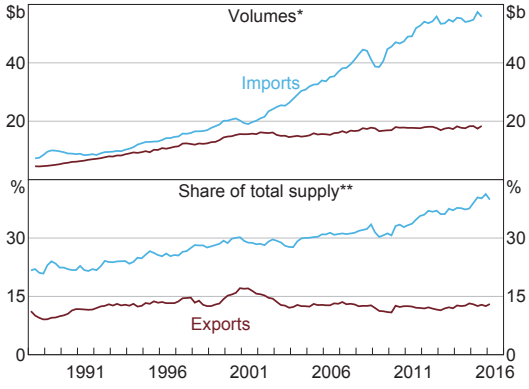


* Financial year, 1989/90 = 100
** 2010/11 = 100
Sources: ABS; RBA; World Trade Organization

The Australian Dollar and Implications for Competitiveness

The appreciation of the Australian dollar from 2000 to 2013 worked against the international competitiveness of Australian manufacturing (Graph 4). Exports of Australian manufactured goods grew slowly over this period as they became relatively more expensive overseas (Graph 5). At the same time, Australian companies' propensity to import manufactured goods increased steadily due to a combination of greater purchasing power, a relatively low tariff structure and the emergence of cheaper suppliers of manufactured goods, most notably from China.

Graph 5
Australian Manufactured Goods Trade



* Chain linked
** Total supply consists of domestic producers' sales plus imports
Sources: ABS; RBA

The Bank's liaison program suggests that one of the most notable responses by manufacturers to increased import competition and the higher value of the dollar was to move some or all of their production offshore. Typically, contacts maintain some productive capacity in Australia, either as a testing or research and development (R&D) facility, to protect their more sensitive intellectual property, or to be able to fill orders more quickly. Nevertheless, firms that have 'offshored' production typically have much less productive capacity remaining in Australia than their overseas operations. Offshoring decisions have also been motivated by concerns over labour costs and the prospect of better access to global supply chains and export markets, allowing firms to take advantage of greater economies of scale.

Since its peak in early 2013, the Australian dollar has depreciated by around 20 per cent on a trade-weighted basis. The associated improvement in international competitiveness has led to a slight increase in export volumes for some manufacturing sub-industries, most notably food, beverage & tobacco products. Nevertheless, the overall response has been fairly subdued to date.[3] To the extent that the prolonged appreciation of the dollar over the past decade caused domestic manufacturers to close or move production offshore, any export response to the more recent depreciation will be muted due to the significant fixed costs associated with reshoring or reopening production facilities.[4] Furthermore, liaison contacts have suggested that there are significant lags between a depreciation of the dollar and a response in manufacturing production and exports due to the nature of supply chains. For instance, even though domestic producers have become more competitive against imported products, retailers or other manufacturers may have contracts that secure supply in advance, which inhibits their ability to switch to domestically produced products.

Another consequence of the depreciation of the dollar is that a number of manufacturers now face higher input costs. Numerous contacts have reported that they responded to the appreciation of the dollar by importing more goods, either by choice or necessity as production of some inputs had moved offshore. In turn, following the more recent depreciation, these contacts have noted that while the lower value of the dollar aids demand,

3 See Cole and Nightingale (forthcoming) for further discussion.

4 A situation whereby a sharp increase in foreign demand for commodities from one industry leads to an appreciation of the exchange rate and loss of competitiveness for another industry is commonly known as 'Dutch Disease'. Downes, Hanslow and Tulip (2014) estimate that the level of manufacturing output in 2013 was around 5 per cent lower than it would have been in the absence of the mining investment boom.

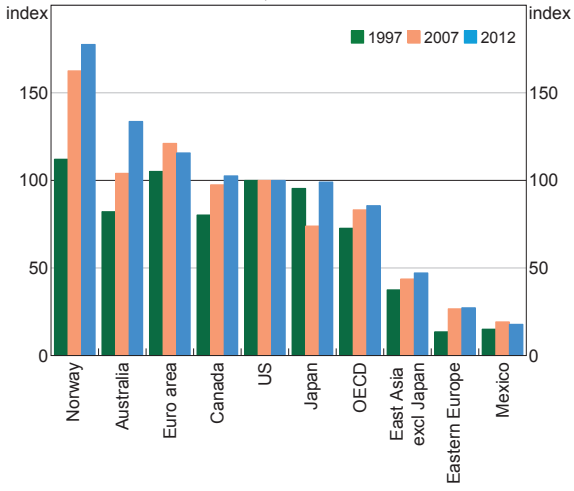
margins are under pressure due to rising import costs in instances where local substitutes are not readily available.

Domestic Input Costs and Implications for International Competitiveness

Beyond the influence of foreign competition and the exchange rate, domestic cost pressures, most notably labour costs, are often cited by liaison contacts as a challenge for the sector. Australian manufacturing labour costs appear to be relatively high compared with those in other economies – a feature that has become more pronounced over time (Graph 6). While some of the loss in Australian competitiveness over the period from 1997 to 2012 in US dollar terms was owed to the appreciation of the Australian dollar, nominal manufacturing labour costs increased by around 80 per cent in Australian dollar terms over this period, averaging 4 per cent per annum. Rising labour costs in foreign currency terms need to be offset by productivity gains in order to maintain international competitiveness. However, manufacturing productivity had not grown by enough in Australia to offset increasing domestic labour costs and the higher Australian dollar, resulting in a loss of competitiveness against other economies up to 2012 (OECD 2015).

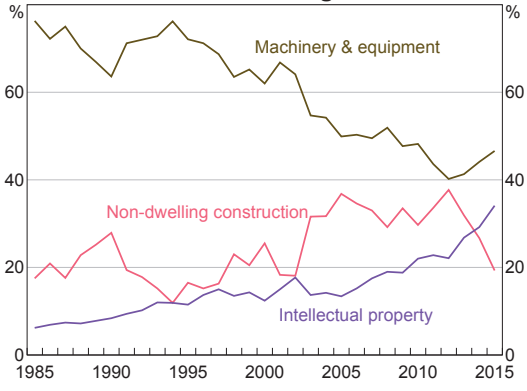
Relatively high labour costs imply that the domestic industry has a comparative disadvantage in producing homogenous, labour-intensive goods. A common theme from liaison in recent years has been that firms have been looking to find labour productivity gains by automating some production processes. They have also been developing new products to diversify their offering. These shifts are borne out in the nature of firms' investments; increasingly, manufacturers are investing in intellectual property rather than physical capital (Graph 7). Investment in intellectual property, which is comprised largely of expenditure on computer software and R&D, has increased throughout the economy, although the growth in both levels and

Graph 6
Manufacturing Labour Costs
US$, US = 100



Source: Bureau of Labor Statistics

Graph 7
Share of Manufacturing Investment



Sources: ABS; RBA

as a share of sectoral investment has been stronger in the manufacturing sector than most other industries.

Liaison suggests that foreign-owned manufacturing firms operating in Australia are more willing to invest in R&D than physical capital in their Australian subsidiaries, although it is difficult to quantify what share of manufacturing activity is accounted for by these firms. Foreign investment in R&D appears to be in part driven by government tax incentives and Australia's reputation for possessing

a highly educated workforce. In particular, the pharmaceutical and automotive industries are often identified as high quality, regional R&D hubs. Indeed, some automotive R&D operations are expected to remain in Australia beyond the cessation of passenger vehicle production.

While a number of liaison contacts' R&D remains geared toward adapting or localising foreign products for the Australian market, there are some instances of local companies with relatively high and constant R&D expenditure aimed at creating new, niche products. These operations tend to have a relatively small domestic workforce outside their engineering operations, with some or all production occurring offshore. This innovative, niche product business model is frequently highlighted by industry groups as the way forward for manufacturing in Australia. Businesses are being encouraged to try to capture more of the pre- and post-production work by offering before- and after-market services, such as design and customisation (Roos 2014).

Difficulties Integrating in Supply Chains

Another factor that has a bearing on the performance of the manufacturing sector is the economy's integration in global supply chains. Data on global supply chains suggest that other economies have responded to pressure from cheaper, imported manufactured goods by integrating themselves more effectively into increasingly fragmented global supply chains. For instance, most advanced economies saw an increase in the share of imported content in exports from 1995 to 2005; Australia did not (OECD 2015). Australia's geographic isolation contributes to high trade costs and presents a significant impediment to greater participation in global supply chains. Kelly and La Cava (2014) found that the costs of trading Australia's manufactured goods – largely international transport costs – are in the order of 20–25 per cent higher than the global average. Moreover, data from the ABS's Business Longitudinal Database show that only 4 per cent of manufacturing firms are part of an integrated supply chain.

In addition, Australia's relatively high trade costs leave domestic producers primarily exposed to the relatively small domestic market and unable to benefit from the scale advantages that other advanced economies achieve through production for larger domestic markets and export markets. Battersby (2006) finds that around 45 per cent of the difference between US and Australian non-farm labour productivity levels can be explained by Australia's geographic isolation. High trade costs may also protect less productive domestic firms from import competition, although this protection is likely to have been eroded through time by lower international search and transaction costs. Australian firms' relative isolation is also borne out by data on collaboration between firms; Australian companies are much less reliant on international partners for collaborative opportunities than are firms in other advanced economies (OECD 2011).

Conclusion

The depreciation of the Australian dollar over recent years has helped to improve the competitiveness of Australian manufacturing. Additionally, there is likely to be a steady level of activity in the food, beverages & tobacco sub-industry due to Australia's comparative advantage in primary resources and growing export demand. Against this, softer demand from the mining sector and the cessation of passenger vehicle production will weigh on output, although motor vehicle and transport equipment production currently makes up only around 5 per cent of manufacturing output.

In the longer term, the structural challenges facing the Australian manufacturing sector are likely to constrain output. Declining global prices for manufactured goods and the sustained high level of the Australian dollar during the resource investment boom impaired the viability of many Australian manufacturers and precipitated considerable structural change in the sector, with numerous manufacturers either closing or shifting production to lower-cost economies. R&D operations are one area where Australia's cost disadvantages are less of an impediment and our highly skilled workforce is a comparative advantage. Although R&D investment has been growing steadily, the subsequent demand for labour and, in particular, physical capital are likely to be less than was generated by 'traditional' manufacturing activities.

References

Battersby B (2006), 'Does Distance Matter? The Effect of Geographic Isolation on Productivity Levels', OECD *Economic Studies*, 2006(1), pp 205–225.

Cole D and S Nightingale (forthcoming), 'Sensitivity of Australian Trade to the Exchange Rate', RBA *Bulletin*.

Downes P, K Hanslow and P Tulip (2014), 'The Effect of the Mining Boom on the Australian Economy', RBA Research Discussion Paper No 2014-08.

Kelly G and G La Cava (2014), 'International Trade Costs, Global Supply Chains and Value-Added Trade in Australia', RBA Research Discussion Paper No 2014-07.

Kent C (2014), 'Non-Mining Business Investment – Where to from Here?', Speech to the Bloomberg Economic Summit, Sydney, 16 September.

OECD (Organisation for Economic Co-operation and Development) (2011), 'International Collaboration on Innovation', in *OECD Science, Technology and Industry Scoreboard 2011*, OECD Publishing, Paris.

OECD (2015), 'Australian Manufacturing in the Global Economy', study for the Australian Government, Department of Industry, Innovation, Science, Research and Tertiary Education.

RBA (Reserve Bank of Australia) (2014), 'The RBA's Business Liaison Program', RBA *Bulletin*, September, pp 1–5.

Roos G (2014), 'The Constantly Changing Manufacturing Context', in *Advanced Manufacturing; Beyond the Production Line*, CEDA, Melbourne, pp 31–56.

China's Demographic Outlook

Jiamin Lim and Arianna Cowling*

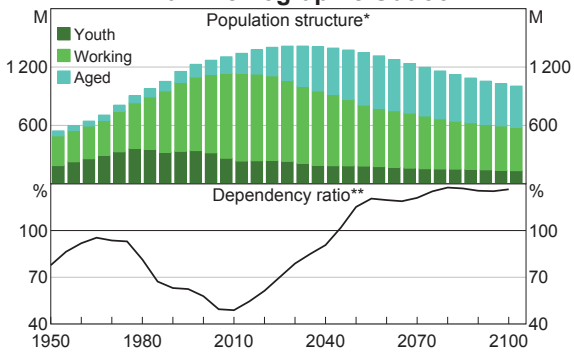
The significant increase in the working-age portion of China's population over recent decades was an important contributor to China's rapid economic growth. In coming decades, however, China's working-age population is expected to contract and the dependency ratio, which is the ratio of non-working-age to working-age population, is expected to increase substantially. Other things being equal, such demographic changes will have fiscal implications and tend to reduce the economy's potential growth rate. Scenarios presented in this article suggest that it appears inevitable that China's dependency ratio will rise and the working-age population will not increase from current levels. As such, the boost to economic growth provided by the demographic dividend of the past decades is not likely to be repeated.

Introduction

The fertility rate in China began declining in the 1950s and in the late 1970s the Chinese authorities introduced the one-child policy, which limited the number of children that many families could have, especially in urban areas.[1] This policy is likely to have reinforced the decline in the fertility rate, although it is difficult to quantify its effect given the downward trend in fertility already in train. Due to the substantial fall in China's fertility rate since the 1950s, cohorts born recently are smaller in number than the cohorts that are now of working age, and so the working-age population has grown large relative to the rest of the population (Graph 1).

Given the population dynamics, China's dependency ratio, which is defined as the ratio of non-working-age (dependent) population to working-age population, began declining in the 1960s and reached a minimum around 2010.[2] This, combined with the increase in the working-age population, is likely to have helped increase China's potential output growth. Not only did China's potential labour input increase over that period, but the decline in the dependency ratio underpinned a relatively high savings rate, supporting investment and potentially raising the rate of economic growth (see Golley, Tyers and Zhou (2016)). It has

Graph 1
China – Demographic Outlook



* Youth is defined as 0–14 years, aged is defined as over 55 years for females and over 60 years for males

** Ratio of non-working-age to working-age population

Sources: RBA; United Nations

* The authors are from Economic Group. This work benefited from earlier internal work undertaken within Economic Group by Alex Cooper.

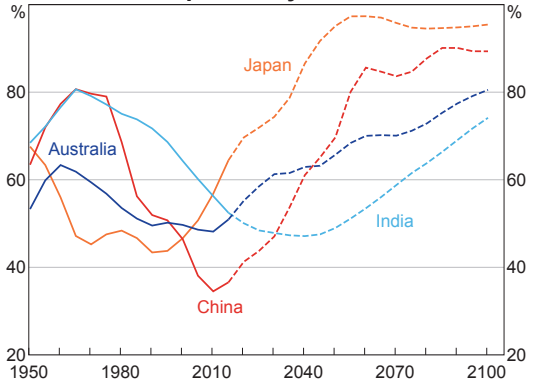
1 The main goal of China's one-child policy was to curb population growth. While the details and implementation of the policy varied over time and depended somewhat on specific circumstances, the authorities typically encouraged couples to have one child by providing financial and other incentives, such as preferential access to education and health services, and by imposing financial levies or other penalties for each additional child after the first. There were numerous exemptions to the policy, which often applied in rural areas and for ethnic minorities (Kane and Choi 1999).

2 China's working-age population is taken to be all males aged 15 to 59 years and all females aged 15 to 55 years, reflecting current retirement age policies.

been argued that a large part of China's growth over the past 30 years can be attributed to this so called 'demographic dividend' (Cai and Lu 2013). In addition to its impact on potential output and economic growth, the decline in the dependency ratio had large fiscal implications, particularly for the pension, healthcare and education systems (Lee, Xu and Syed 2013). A relatively large working-age population has provided higher income tax revenues to fund such systems and has been less dependent on these systems' services, at least so far.

China's dependency ratio in 2015 was 55 per cent, meaning that there were around 55 dependent persons per 100 working-age persons. Of these dependants, half were younger than working age and half were older. China's dependency ratio is currently low compared with that in Australia and other Asian economies, but this is not expected to remain the case. In coming decades, China's dependency ratio is projected by the United Nations (UN) to increase at a similar rate to Japan's, overtaking Australia in around 2040 and remaining around 80–90 per cent from 2060 onwards (Graph 2). This means that there will be almost twice as many dependants per working-age person in China as there are now. In addition, the working-age population peaked in 2010 and is expected to continue to decline. The Chinese authorities have acknowledged the challenges posed by these demographic changes and policy responses are in train. This article considers a range of scenarios for the fertility rate and the retirement age, and the likely effect on the outlook for China's demographic structure over the next century.[3]

Graph 2
Dependency Ratio*



* Working age population defined as 15–64 years
Sources: RBA; United Nations

Changes in the Fertility Rate

China's fertility rate, at 1.6 births per woman, is among the lowest in the world (UN 2015).[4] To 'balance population development and address challenges associated with an ageing population', the State Council announced in 2015 that it would formally end the one-child policy, allowing all couples to now have two children (Bao 2015).[5]

While it is not immediately clear what impact this will have on the fertility rate, we investigate the impact of potential changes using UN projection scenarios for 'low', 'medium' and 'high' fertility rates in China out to 2100 (Graph 3).[6] Under all the fertility scenarios, China's working-age population declines at a similar rate over the next few decades, and is lower over the next 100 years than it is now. The dependency ratio rises before flattening out around 2080 for all scenarios (Graph 4).

- Under the 'medium' scenario, the fertility rate is 1.6 births per woman in 2015 (in line with official estimates) and rises only slightly over the projection period. This is used as our baseline

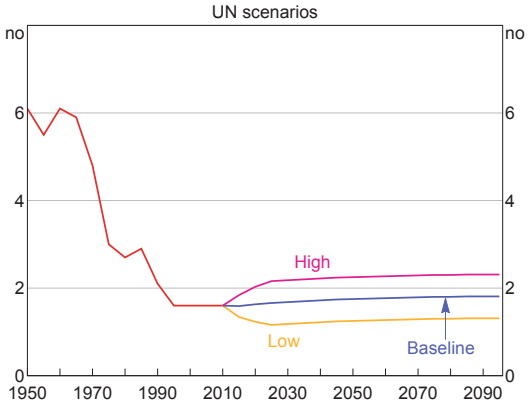
3 UN estimates suggest the net international migration rate is currently around zero, and is projected to remain there over the projection horizon. In our scenario analysis we ignore the impact of migration on the population.

4 While a fertility rate of 1.6 births per woman is in line with official estimates, some demographers estimate it to be slightly lower, at around 1.3 (Cai and Du 2009; NHFPC 2013). China's fertility rate has remained higher than 1 birth per woman, despite the one-child policy, because it did not cover all couples (see footnote 1). The effective coverage of the policy was estimated to be around 63 per cent of the total population in 2000 (East-West Center 2005).

5 In 2013, the policy was relaxed so that families would be permitted to have two children if either parent was a single child (NPC 2013). In 2015, the one-child policy was formally abolished; all couples are now allowed to have two children (Bao 2015).

6 The three scenarios presented here are based on UN projections for fertility rates, which we take as given. Not only is there uncertainty around these projections, but the scenarios are not equally likely, and the UN does not specify the expected likelihood of the three scenarios.

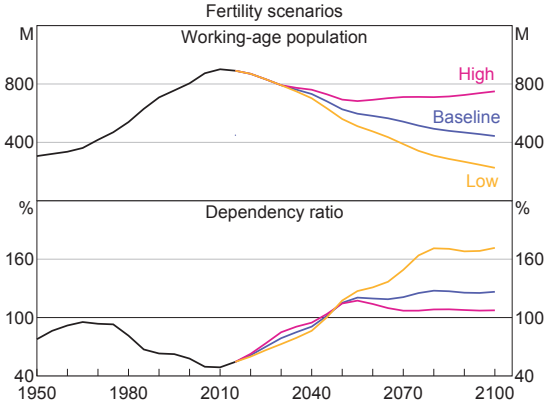
Graph 3
China – Total Fertility Rate*



* Total lifetime fertility per woman, assuming zero mortality

Sources: RBA; United Nations

Graph 4
China – Demographic Outlook



Sources: RBA; United Nations

scenario. The working-age population declines persistently over the projection period and the dependency ratio rises.

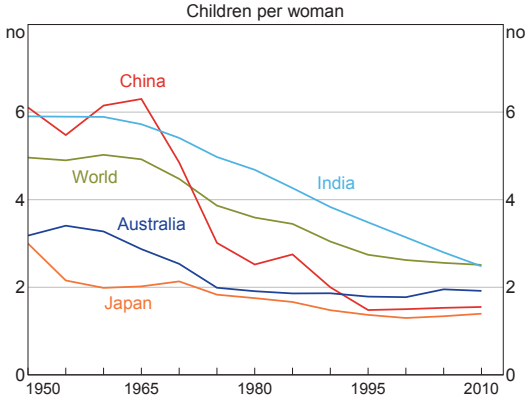
- Under the 'high' scenario, the fertility rate is 1.8 in 2015, and rises and stabilises at slightly above 2.1 (often called the 'population replacement fertility rate'). The working-age population declines initially but rises after 2055 as the larger youth cohorts reach working age. The dependency ratio initially rises to be higher than under the baseline scenario but falls below it in the long term. This is because the higher fertility rate leads to an increase in the youth population, which raises the dependency ratio until these cohorts enter the working-age population.[7]
- Under the 'low' scenario, the fertility rate falls from 1.3 in 2015 but then rises a little over the projection period. The working-age population declines at a faster rate compared to the baseline scenario. The dependency ratio is initially lower than under the baseline scenario, but rises to be well above it towards to the latter part of the century.

The three scenarios are based on UN projections for fertility rates, but are not all equally likely. In particular, there is evidence to suggest that the high-fertility scenario is less likely to materialise in practice as it relies on a positive response from the relaxation of the one-child policy. This is unlikely because much of the decline in the fertility rate since the 1970s appears to reflect forces unrelated to China's fertility policies. Indeed, much of the decline in China's fertility rate had already begun before the one-child policy was introduced, and fertility rates have declined in many countries without such strict policies (Graph 5). While fertility in China declined at a comparatively fast rate, it is likely that the decline in part reflects a global trend towards smaller families. Consistent with this, official data and survey-based estimates for China suggest that the one-child policy has not been a binding constraint for most couples in recent years.[8] Reasons cited for preferring a smaller family include the high opportunity costs for childbearing females and lack of sufficient childcare facilities. These factors suggest that, while the authorities may aim to encourage higher fertility by relaxing family planning policies, China is unlikely to experience a substantial increase

7 Research finds that, in the long run, a higher fertility rate, which boosts labour supply, will tend to slow the decline in potential growth (Lu and Cai 2014; Cai and Roberts 2015).

8 Less than 15 per cent of eligible couples applied to have a second child in the 18 months after the one-child policy was relaxed in late 2013 (Shan 2015). A range of studies conducted between 2000 and 2010 suggested that mean fertility preferences were 1.5 births per woman in urban areas and 1.8 in rural areas, which suggests a national average around 1.6, close to official estimates of the current fertility rate.

Graph 5
Total Fertility Rate*
Children per woman



* Total lifetime fertility per woman, assuming zero mortality
Sources: RBA; United Nations

in fertility rates unless other structural issues are addressed.[9]

Increase in the Retirement Age

Another policy lever available to the Chinese authorities to address the challenges associated with the ageing population is to increase the retirement age, which currently stands at 60 years for males and 50 or 55 years for females, depending on occupation.[10] These ages were set in the 1950s when life expectancy in China, conditional on reaching 60 years of age, was around 70 years.[11] This is much lower than the current life expectancy of 80 years and the UN projections of around 85 years in 2050 and 91 years in 2100. In 2015, the authorities announced their intention to gradually increase the retirement age, allowing it to rise by several months per year between 2017 and 2022 (Shi *et al* 2015). Full details of the change will be released later this year (State Council 2016a).

One simple approach for assessing the potential impact of an increase in the retirement age is to adjust the definition of the working-age population in line with projected retirement age changes. We assume that China will increase the retirement age gradually to 65 years, for both men and women, between 2020 and 2035. The final retirement age of 65 years is in line with international standards, while the rate of adjustment implied is in line with the authorities' proposal to raise the retirement age by several months a year.

Under the medium-fertility scenario described in the previous section, an increase in the retirement age will reverse the decline in the working-age population for a period (Graph 6). However, in the long run the increase of the retirement age only delays the decline in the working-age population. The retirement age policy change has a much larger impact on the dependency ratio.[12] The dependency ratio falls slightly in the short run as the working-age population increases and, although it subsequently rises, the dependency ratio only reaches 90 per cent by 2100, compared with 125 per cent in the case of no change in the retirement age.

However, raising the retirement age in China would, as in many other countries, be unpopular. Several media reports of public surveys conducted over the past few years suggest strong public opposition to increases in the retirement age, especially from women (Wong 2015). Commonly cited concerns include the limited capability of people to work past 60 years (particularly in more physically intensive sectors such as mining) and increased difficulty for young adults to find work (Higo and Klassen 2015).

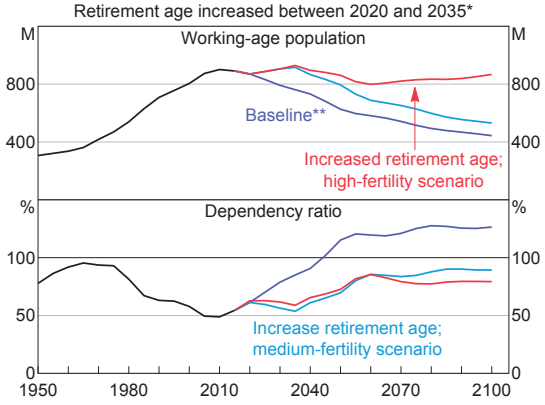
9 While the authorities have not stated their estimates of the effect of the end of the one-child policy on the fertility rate, official estimates suggest that with the relaxation, only 17 million of the 90 million newly eligible couples will have a second child, contributing to an additional 30 million people joining the workforce by 2050 (Shan 2016; Wang 2015).

10 The retirement age is 60 years for men, 55 years for female white-collar workers and 50 years for female blue-collar workers (State Council 2016b).

11 Life expectancy at birth in the 1950s was around 45 years.

12 While the results are sensitive to the final retirement age chosen and the speed of adjustment, in all scenarios any increase in the retirement age slows the rise of the dependency ratio. For example, one option is to increase the retirement age to 65 years in 2035, after which the retirement age increases at the same rate as life expectancy. Under this scenario the rise of the dependency ratio slows markedly, with the dependency ratio reaching around 70 per cent at the end of the projection period, compared with 90 per cent when no adjustment is made to account for increased life expectancy after 2035.

Graph 6
China – Demographic Outlook
Retirement age increased between 2020 and 2035*



* Increased from 60 to 65 years for males, and from 55 to 65 years for females

** No change in the retirement age; medium-fertility scenario

Sources: RBA; United Nations

There are concerns about the impact of the change in pension eligibility for people close to the current retirement age, and it has also been claimed that China's older workers lack skills (Giles *et al* 2015).

Under the high-fertility scenario, an increase in the retirement age implies that the working-age population is slightly lower than the current level by 2100, and the dependency ratio would rise but stabilise at a lower level compared with the medium-fertility assumption (Graph 6). Thus, even if a higher fertility rate and later retirement age are achieved, China's working-age population is unlikely to continue to increase and its dependency ratio would be higher than its current level.

Implications of China's Demographic Outlook

In all the scenarios considered above, China's working-age population falls below the current level and the dependency ratio increases. An increasing dependency ratio, particularly when driven by aged dependency, puts pressure on the government's fiscal position through higher health and pension expenditure and lower income tax revenues (due to a smaller tax base) than otherwise.

Even though the dependency ratio eventually reaches a similar level to that of the 1970s, under the increased retirement age scenario, its composition is very different. In 2100, aged dependants are the main contributor to the high dependency ratio, as opposed to youth dependants in the 1970s (Graph 7).[13] It is difficult to estimate public expenditure per capita on the youth versus the aged in China, but international estimates suggest that public expenditure on the aged (such as pensions and health services) typically exceeds expenditure on the youth population (such as education services) (Isaacs 2009).

The International Monetary Fund (IMF) has estimated that China's pension expenditure was 3.4 per cent of GDP in 2010 and will increase to 9 per cent by 2050 due to the ageing of the population (IMF 2011).[14] The current pension system is primarily managed by local governments and there have been reports of underfunding due to high legacy costs.[15] In some cases, the central government has had to intervene with subsidies to offset the shortfalls in these local government pension systems; an ageing population will add further pressure (Pozen 2013). Already a substantial number of aged people report that they are financially reliant on their families, so working-age adults, particularly from one-child families, may come under increasing financial strain as their parents age.[16] In addition, an ageing population will place pressure on healthcare services, creating demand for a more comprehensive system of long-term care for the elderly (Feng *et al* 2012).

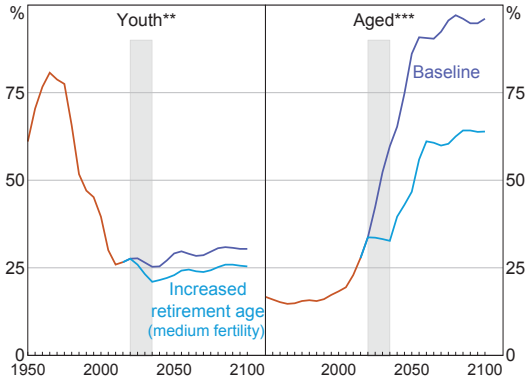
13 The youth dependency ratio is calculated as the ratio of the youth population to the working-age population. The aged dependency ratio is calculated as the ratio of the aged population to the working-age population

14 In the absence of detailed information about pension reform in China, the projections are based on assumptions such as a constant coverage ratio and constant replacement rate. The IMF's estimates for China are similar to that of Oksanen (2010), which assumes that the generosity of public pensions remains at the current level.

15 For example, legacy costs include payments to state sector employees who were not required to make pension contributions prior to 1997.

16 In urban areas, around 37 per cent of aged persons surveyed reported that family support was their main source of income while 45 per cent stated that pensions were their main source of income. In rural areas, 54 per cent reported family support as their main source of income, while 5 per cent stated that it was pensions (Dorfman *et al* 2013).

Graph 7
China – Dependency Ratio Projections
Retirement age increased between 2020 and 2035*



* Increased from 60 to 65 years for males and from 55 to 65 years for females; grey shading shows period where retirement age is adjusted
** Youth defined as 0–14 years
*** Aged defined as over 55 years for females and over 60 years for males prior to the retirement age adjustment
Sources: RBA; United Nations

A declining working-age population and increasing dependency ratio will, other things being equal, place downward pressure on China's potential growth rate by reducing the labour supply and lowering the extent of saving, which in turn may affect the ability to fund investment. One way to offset the impact on potential growth would be to improve productivity. Initiatives, such as increasing the gross enrolment rate in higher education, could help facilitate an increase in workforce productivity (World Bank and DRC 2014).[17] Moreover, China's urbanisation rate is expected to increase from around 55 per cent in 2015 to 80 per cent by 2050, and the shifting of resources away from lower-productivity rural activities could further support total productivity growth (Annez and Buckley 2008).

Raising participation rates is another way to offset the effect of a declining working-age population on potential labour supply and growth. Participation rates in China are estimated to vary considerably by gender, age, education, and urban or rural location. For example, women currently have lower participation rates than men, and policies that increase women's participation could help reduce the downward pressure on the labour force (World Bank 2016).[18] Increasing time spent in education will reduce the participation rate of younger persons, but may improve their productivity once they enter the labour force and increase participation throughout their lives (Lu and Cai 2014).

Conclusion

A range of scenarios suggest that China's working-age population will not increase and that the dependency ratio will rise over the next few decades. The scenarios considered suggest that an increased fertility rate would be most effective in eventually stopping the decline in the working-age population, while a sizeable increase in the retirement age would have a more immediate and significant impact on the dependency ratio. As a large increase in China's fertility rate appears unlikely in light of the downward trend in fertility rates (which appears to be, at least in part, independent of the one-child policy), efforts to increase the retirement age may be more effective in addressing China's demographic challenges in the period ahead. However, even an increase in the retirement age is unlikely to be straightforward to implement.

The policies discussed here – even if successfully implemented – are not likely to reverse the trend of an increasing dependency ratio and declining working-age population in the longer run. The demographic dividend provided China with a one-off boost to growth and it is likely that growth in the future will need to be driven by productivity, which would benefit from further reform.

17 China's higher-education gross enrolment rate was around 30 per cent in 2012. The authorities have stated that their aim is to achieve a rate of 40 per cent by 2020 (MOE 2010).

18 Estimates of female participation rates are based on data from the China Health and Retirement Longitudinal Study.

References

Annez PC and RM Buckley (2008), 'Urbanization and Growth: Setting the Context', in M Spence, PC Annez and RM Buckley (eds), *Urbanization and Growth*, Commission on Growth and Development, World Bank Publications, Washington DC, pp 1–46.

Bao D (2015), 'Couples Allowed to have 2 Children', *State Council*, viewed 1 November 2015. Available at <http://english.gov.cn/news/top_news/2015/10/30/content_281475223354250.htm>.

Cai F and I Roberts (2015), 'Potential Growth and Rebalancing in China', RBA *Bulletin*, June, pp 29–37.

Cai F and Y Du (eds) (2009), *The Approaching Lewis Turning Point and Its Policy Implications*, The China Population and Labor Yearbook, Volume 1, BRILL, Leiden.

Cai F and Y Lu (2013), 'The End of China's Demographic Dividend: The Perspective of Potential GDP Growth', in R Garnaut, F Cai and L Song (eds), *China: A New Model for Growth and Development*, ANU E Press, Canberra, pp 55–74.

Dorfman MC, R Holzmann, P O'Keefe, D Wang , Y Sin and R Hinz (2013), *China's Pension System: A Vision,* Directions in Development: Human Development, World Bank, Washington DC, p 237.

East-West Center (2005), 'Can China Afford to Continue Its One-Child Policy?', *Asia Pacific Issues,* No 77, March.

Feng Z, L Chang, X Guan and V Mor (2012), 'China's Rapidly Aging Population Creates Policy Challenges in Shaping a Viable Long-term Care System', *Health Affairs,* 31(12), pp 2764–2773.

Giles J, X Lei, Y Wang and Y Zhao (2015), 'One Country, Two Systems: Evidence on Reitrement Patterns in China', Asian Bureau of Finance and Economic Research Working Paper, February.

Golley J, R Tyers and Y Zhou (2016), 'Contractions in Chinese Fertility and Savings: Long Run Domestic and Global Implications', Paper presented at the Reserve Bank of Australia Conference, *'Structural Change in China: Implications for Australia and the World'*, Sydney, 17–18 March.

IMF (International Monetary Fund) (2011), 'The Challenge of Public Pension Reform in Advanced and Emerging Economies ', Policy paper prepared by the Fiscal Affairs Department, 28 December.

Isaacs JB (2009), 'A Comparative Perspective on Public Spending on Children', Brookings Centre on Children and Families Working Paper, November.

Kane P and Y Choi (1999), 'China's One Child Family Policy', *British Medical Journal,* 319(7215), pp 992–994.

Lee IH, Q Xu and M Syed (2013), 'China's Demography and its Implications', IMF Working Paper WP/13/82.

Lu Y and F Cai (2014), 'China's Shift from the Demographic Dividend to the Reform Dividend', in L Song, R Garnaut and F Cai (eds), *Deepening Reform for China's Long-term Growth and Development,* China update series, ANU Press, Canberra, pp 27–50.

McIntosh B and C Zhang (2015), 'Ageing Challenges in China's Workforce: Demographic Projections, Labour Market Dynamics and Solutions', in M Higo and TR Klassen (eds), *Retirement in Japan and South Korea: The Past, the Present and the Future of Mandatory Retirement,* Routledge, New York, pp 129–147.

MOE (Ministry of Education of the People's Republic of China) (2010), 'China's New National Education Plan Aims to Build A Country with Rich Human Resources', 30 July. Available at <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s3501/201010/109031.html>.

NHFPC (National Health and Family Planning Commission of the People's Republic of China) (2013), 'Statement of National Health and Family Planning Commission of China', 19 November. Available at <http://www.nhfpc.gov.cn/jczds/s3578/201311/f852a9d6833d4c1eb79b9e67f1885416.shtml>.

NPC (The National People's Congress of the People's Republic of China) (2013), 'China Reviews Bill to Ease One-Child Policy', 24 December. Available at <http://www.npc.gov.cn/englishnpc/news/2013-12/24/content_1819669.htm>.

Oksanen H (2010), 'The Chinese Pension System: First Results on Assessing the Reform Options', Economic Papers 412, June.

Pozen C (2013), 'Tackling the Chinese Pension System', Paulson Policy Memorandum, July.

Shan J (2015), 'Family Planning Policy Sees Big Overhaul', *State Council*, viewed 10 November 2015. Available at <http://english.gov.cn/news/top_news/2015/10/30/content_281475223356896.htm>.

Shan J (2016), 'Two-Child Policy to Create 30m More Workers by 2050', *China Daily*, viewed 15 January 2016. Available at <http://www.chinadaily.com.cn/china/2016-01/11/content_23032394.htm>.

Shi R, H Xu, B Zhang and J Yao (2015), 'Slowly, China Prepares to Raise Retirement Age', *Caixin Online*, viewed 10 January. Available at <http://english.caixin.com/2015-04-01/100796734.html>.

State Council (The State Council, the People's Republic of China) (2016a), 'China to Unveil Retirement Age Plan in 2016', 29 February. Available at <http://english.gov.cn/news/top_news/2016/02/29/content_281475298711664.htm>.

State Council (2016b), 'China Plans to Raise Age of Retirement', 1 March. Available at <http://english.gov.cn/state_council/ministries/2016/03/01/content_281475299145295.htm>.

UN (United Nations) (2015), 'World Population Prospects: The 2015 Revision', Comprehensive Dataset in Excel, 29 July.

Wang X (2015), '90m More to be Eligible for 2nd Child', *China Daily*, 11 November. Available at <http://www.chinadaily.com.cn/china/2015-11/11/content_22425704.htm>.

Wong CH (2015), 'Selective Inequality? China Retirement Age Plan Sparks Backlash among Women', China Real Time, 1 December. Available at <http://blogs.wsj.com/chinarealtime/2015/12/03/selective-equality-china-retirement-age-plan-sparks-backlash-among-women>.

World Bank (2016), Live Long and Prosper: *Aging in East Asia and Pacific,* World Bank East Asia and Pacific Regional Reports, World Bank, Washington DC, p 287.

World Bank and DRC (World Bank and Development Research Center of the State Council, the People's Republic of China) (2014), *Urban China : Toward Efficient, Inclusive, and Sustainable Urbanization,* World Bank, Washington, DC.

Banking Fees in Australia

Kelsey Wilkins*

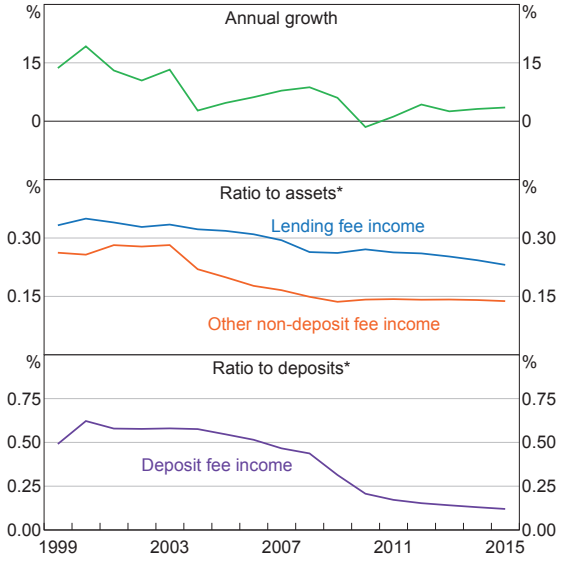
The Reserve Bank has conducted a survey on bank fees each year since 1997. The results of the most recent survey suggest that banks' fee income from both households and businesses rose in 2015, due to a combination of balance sheet growth and higher unit fees on some products. Deposit and loan fees have continued to decline as a ratio to the outstanding value of deposits and assets, respectively.

Overview

The Reserve Bank's annual survey of bank fees provides information on the fees earned by banks through their Australian operations.[1] The focus of the survey is on fee income generated through the provision of loans, deposit services and payment services. The 2015 survey included 16 institutions, capturing over 90 per cent of the Australian banking sector by balance sheet size.[2] Fees earned from operations outside of Australia and other fee income obtained through funds management and insurance operations are excluded from the survey. This article summarises the results from the latest survey, covering banks' financial years ending in 2015.[3]

In 2015, domestic banking fee income grew by 3.5 per cent, to around $12.5 billion (Table 1). This reflected moderate increases in fees paid by both households and businesses, driven by a combination of volume growth and increases in some unit fees. Deposit and loan fees as a ratio to the outstanding value of deposits and assets, respectively, were slightly lower than in the previous year (Graph 1).

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

* The author is 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 participating banks.

2 Survey results have been affected by mergers and acquisitions among participating institutions and some changes in participants' methodology (wherever 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 between banks.

Table 1: Banks' Fee Income

	Households		Businesses		Total	
	Level	Growth	Level	Growth	Level	Growth
	$ million	Per cent	$ million	Per cent	$ million	Per cent
2012	4 054	–0.7	7 368	7.2	11 421	4.3
2013	4 118	1.6	7 593	3.1	11 711	2.5
2014	4 206	2.2	7 872	3.7	12 079	3.1
2015	4 328	2.9	8 176	3.9	12 504	3.5

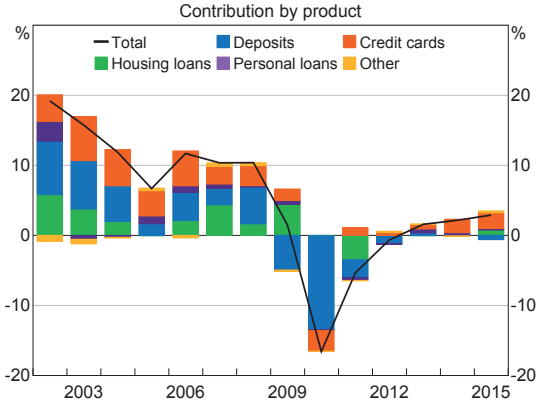
Source: RBA

Households

Banks' fee income from households grew by 2.9 per cent in 2015, the third consecutive year of positive growth (Table 2). Higher fee income largely reflected growth in fee income from credit cards, which grew strongly for the second consecutive year. Growth in housing and personal lending fees was moderate, while fee income from deposit products declined in 2015 (Graph 2).

Fee income from credit cards, the largest single source of fee income from households, increased strongly in 2015. The increase in fee income from credit cards was due to both more instances of fees being charged and an increase in unit fees on some products. An increase in currency conversion

Graph 2
Growth in Household Fee Income
Contribution by product



Source: RBA

Table 2: Banks' Fee Income from Households

	2013	2014	2015	Annual growth 2015	Average annual growth 2007–14
	$ million	$ million	$ million	Per cent	Per cent
Loans:	2 904	2 999	3 135	4.5	2.2
– Housing	1 218	1 219	1 251	2.7	1.8
– Personal	350	366	376	2.7	2.2
– Credit Cards	1 335	1 414	1 508	6.6	2.6
Deposits	1 111	1 108	1 083	–2.3	–7.8
Other fees	103	100	111	11.3	1.9
Total	4 118	4 206	4 328	2.9	–1.3

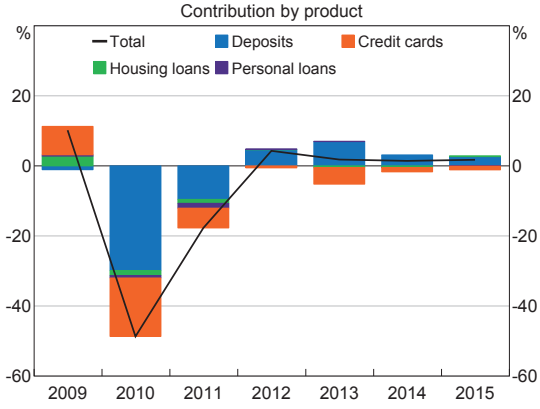
Source: RBA

fees incurred by households for overseas purchases was largely a result of an increase in the number of foreign currency transactions, with only a small increase in average unit fees (Table 3). Banks increased some unit fees during 2015, in particular those relating to credit card annual fees and cash advances. Several banks also increased fee income from credit cards through the acquisition of existing credit cards from other providers. Some improvements to participants' reporting methodologies also resulted in the inclusion of some credit card fee income that was previously being excluded from the RBA's survey.

Income from exception fees charged to households on credit card products continued to decline in 2015 (Graph 3). This was the result of customers reducing the number of instances in which they exceeded their credit card limits or made late payments.

The main drivers of modest growth in fee income on personal lending were higher unit fees and increased turnover. Some banks also increased lending volumes, resulting in higher establishment and loan registration fee income.[4] Income from exception fees and transaction fees on personal lending declined.

Graph 3
Growth in Household Exception Fees
Contribution by product



Source: RBA

Growth in fee income from housing loans was consistent with housing credit growth during 2015. Higher fee income was due to a higher volume of new loans, more instances of early repayment fees and, to some extent, higher unit fees on home loan packages. The major banks and large regional banks recorded the highest growth in housing loan

Table 3: Unit Fees on Credit Cards[(a)]

	2013	2014	2015	Annual growth 2015
				Per cent
Annual fees ($)				
Non-rewards cards	61	51	53	4.7
Rewards cards	170	186	185	–0.5
All cards	127	134	133	–1.1
Other fees				
Foreign currency conversion fees (per cent of value)	2.8	2.9	2.9	0.3
Late payment fee ($)	19	19	17	–8.4

(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

4 Fee income from personal loans was also affected by improvements to participants' reporting methodologies, resulting in higher fee income in 2015 being reported from this category than would have otherwise been the case.

fee income, while some smaller regional banks reported declines in fee income as a result of lower volumes of loans.

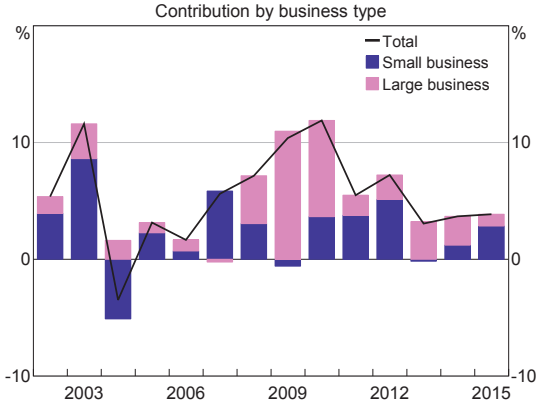
Fee income from deposit accounts declined further over 2015. The decline in fee income was broad based across most types of deposit fees, but there were notable declines in fee income relating to non-transaction accounts such as term deposits and online savings accounts. The introduction of notice periods for 'breaks' on term deposit contracts has resulted in fewer instances of these fees; where customers were previously charged a fee for breaking the duration of their term deposit, 31-day notice periods for withdrawals have resulted in fewer banks charging these fees. In addition, customers have shifted towards deposit products with lower fees, such as online savings accounts. Higher use of contactless payments facilities and decreased use of cash has also led to fewer ATM withdrawals and therefore fewer charges. Some banks lowered their unit fees on international withdrawals from deposit accounts, resulting in declines in fee income from this activity. Somewhat offsetting these declines, income from other fees (such as currency conversion fees) and exception fees on deposit accounts increased (Graph 3).

Businesses

Total fee income from businesses increased by 3.9 per cent, primarily reflecting higher fee income from small businesses (Graph 4; Table 4). By product, growth in fee income from businesses continued to be driven by merchant fees and business loans (Graph 5). Fee income from bank bills declined sharply in 2015, similar to previous years. Fee income from other business products was little changed.

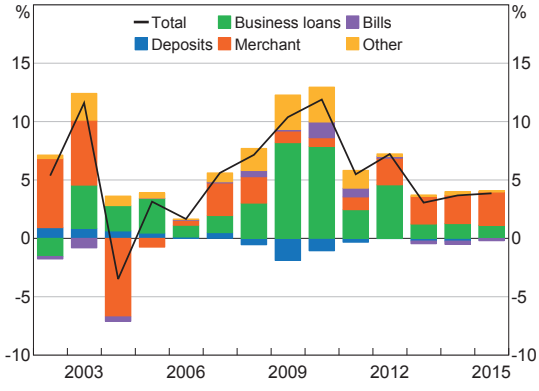
The increase in loan fee income was mainly due to increases in unit fees for small business loans, although lending volumes also increased. Loan fee income from large businesses declined over 2015 as several banks lowered their unit fees due to increased competitive pressures.

Graph 4
Growth in Business Fee Income
Contribution by business type



Source: RBA

Graph 5
Growth in Business Fee Income
Contribution by product



Source: RBA

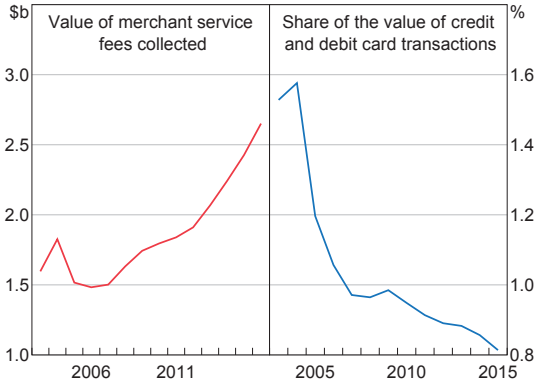
Growth in merchant fee income over 2015 was evenly spread across small and large businesses. The increase in income from merchant fees was largely a result of growth in the number and value of transactions, resulting from a higher number of merchant terminals on issue and increased use of contactless payments. This partially offset a decline in fees earned on cash payment services, via ATM and deposit account withdrawals. A few banks also increased unit fees on merchant services, although the ratio of merchant fee income to the value of credit and debit card transactions continued to decline during 2015 (Graph 6).

Table 4: Banks' Fee Income from Businesses

	2013	2014	2015	Annual growth 2015	Average annual growth 2007–14
	$ million	$ million	$ million	Per cent	Per cent
Deposit accounts	606	589	587	–0.3	–4.9
– of which: exception fees	*41*	*41*	*41*	*–1.8*	*–8.4*
Loans	3 276	3 372	3 460	2.6	10.5
– of which: exception fees	*39*	*42*	*42*	*0.8*	*0.1*
Merchant service fees	2 241	2 427	2 651	9.2	5.8
Bank Bills	226	204	190	–7.1	16.6
Other	1 258	1 280	1 287	0.6	8.7
Total	7 593	7 872	8 176	3.9	6.9
– of which: exception fees	*81*	*83*	*83*	*–0.5*	*–4.9*

Source: RBA

Graph 6
Merchant Service Fee Income



Source: RBA

Somewhat offsetting growth in merchant and loan fee income, bank bill fee income declined over 2015. This reflects a broader shift away from the use of bank bills and encouragement from banks for customers to shift to alternate products.

Fee income from business deposit products also declined slightly. This was mainly due to a reduction in deposits held by these customers; however, the decline in fee income was also the result of customer switching between deposit accounts in order to make use of lower fee products.

Liquidity in Fixed Income Markets

Jon Cheshire*

Fixed income markets in many jurisdictions have been going through a period of change, resulting in a debate as to whether they are continuing to function effectively, or will function effectively in times of stress. Changes in dealer business models and increased use of electronic trading platforms are influencing the nature of liquidity in bond markets. These changes are not as prevalent in Australia as they are in some overseas markets. For instance, while dealer inventories in US and European banks have fallen, in Australia they have been broadly steady, although they have undergone some substantial compositional shifts. Similarly, electronic trading and, in particular, high frequency trading (HFT), does not account for as large a share of trading in Australian financial markets as it does in US and some European markets. As these changes have occurred, market liquidity in some bond market segments in Australia has declined and is lower than it has been in the past. In contrast, market liquidity in derivative markets appears to have improved, such that overall market liquidity across bond and related derivative markets does not appear to have deteriorated. While this is a positive assessment, it is also likely that accommodative monetary policies in many major economies have supported market liquidity in recent years and it is difficult to determine how robust market liquidity would be in the absence of these policies.

Introduction

This article discusses developments in market liquidity and the factors driving change, drawing on recent publications from Bank for International Settlements (BIS) committees in which the Reserve Bank of Australia participated (Markets Committee 2016 and CGFS (2014, 2016)). The first section contains a discussion of some of the developments in market liquidity affecting global bond markets. The next section discusses liquidity in Australian bond markets. The third and fourth sections look at the main factors driving change in bond markets, namely, changes in dealer business models and increased use of electronic trading platforms. This is followed by a discussion of HFT in bond markets.

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Global Developments in Market Liquidity

Market liquidity is considered to be the ability to execute large transactions immediately, at low cost and with limited price impact. As it has multiple dimensions, it is difficult to measure precisely. One dimension is the price of liquidity, which is the difference between the highest price that a buyer is willing to pay for a typical amount of an asset and the lowest price for which a seller is willing to sell it. This is often estimated by the bid-offer spread, and is also referred to as a market's tightness. A market's depth is defined as the size of a trade that can be executed for a given price change. A market's resilience is the speed at which a market's tightness and depth recover after an event.

Changes in bond market liquidity in recent years have been well documented (Markets Committee 2016 and CGFS 2016). In many bond markets,

liquidity was oversupplied and underpriced in the years prior to the global financial crisis. Since then, liquidity has decreased across many bond markets. In general, quantity metrics of liquidity have provided a stronger indication than price metrics that liquidity has declined. Quantity metrics, such as turnover ratios, average transaction sizes and market depth, are generally lower than in the past across a range of markets. These developments indicate that it is more costly to transact in the same volumes than was possible in the past. This is partly because dealers are less able and willing to warehouse large positions for a long period of time. In contrast, developments in measures of the price of transacting in bond markets have generally suggested that liquidity has remained ample. For instance, bid-ask spreads have been narrowing or are around their narrowest in many bond markets. This is partly a consequence of both increased electronic trading, which has resulted in increased competition over the price of transacting, and a reduction in principal-based market making, which has decreased quoted volumes.[1] That is, the narrowing in bid-ask spreads reflects a fall in the volume that can be transacted at these spreads.

Another measure of the price of transacting is the volatility of prices and the size of the risk premiums (such as credit spreads or spreads to swap rates). The low volatility and compressed risk premiums evident across a range of bond markets over the period since the crises in the United States and Europe to around mid 2015 was also consistent with ample liquidity. More recently, these indicators of the price of liquidity have increased. This cycle in risk premiums and volatility is likely to be partly a result of global macroeconomic and financial conditions, and of supportive global monetary policy settings.[2] It remains to be seen whether markets, particularly those that have seen some structural change, are resilient and function effectively in all conditions.

One perspective is that the decrease in market maker involvement and increased use of electronic trading platforms that has been seen in recent years may result in bond market liquidity conditions which are more fragile and less resilient. That is, bond markets may be subject to bouts of volatility that cannot be explained by fundamental drivers as large orders are executed. On the other hand, market makers may have been providing liquidity at below what it cost them, with the consequence that market volatility was dampened and other market participants were not exposed to the true costs of liquidity. This may have led them to make poor investment decisions. It is clear that in the pre-crisis years many dealers were providing bond market liquidity through a build-up of leveraged market and credit risk exposures. As these large positions became unprofitable they were unwound and contributed to a significant period of stress in financial markets. It is the intention of new regulations to ensure that liquidity is priced appropriately. It is notable that, while there has been some rise in volatility and risk premiums over the past year, most of these metrics are not close to the levels observed during the period of crisis in the United States and Europe.

A recent feature of liquidity in some markets has been bouts of large intraday movements. Examples of this include the US 'flash rally' on 15 October 2014, and the German 'bund tantrum', which occurred between May and June 2015 and resulted in large intraday volatility on 7 May. While no single cause of the events has been identified, in both of these markets HFT was prevalent.[3] A concentration of activity within a segment of market participants, as is the case with HFT in these markets, is a risk to the efficient functioning markets (Cheshire 2015).

1 Principal-based market making involves a dealer matching supply and demand in a market by acquiring positions themselves. The dealer holds inventories of securities and commits their own capital for which they expect to earn an appropriate return. When acting as an agent, the dealer's role is to place a customer order in a market and to find another participant willing to take the opposite position. Changes in dealer business models are discussed in detail in CGFS (2014) and Cheshire (2015).

2 For more discussion of how monetary policy affects market liquidity see section 6.2 in CGFS (2014).

3 See the Joint Staff (2015) and Markets Committee (2016).

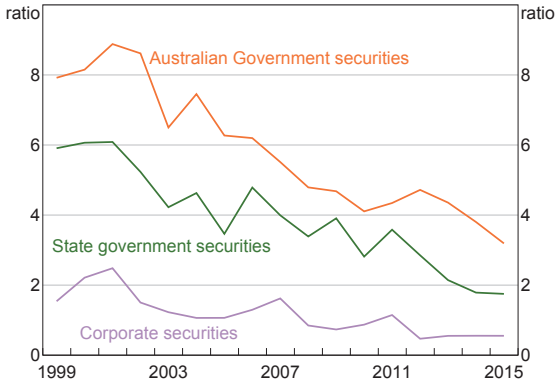
Another trend in market liquidity across bond markets is increased bifurcation, whereby liquidity is concentrated in more liquid instruments and is declining in less liquid instruments. This may be explained by the fact that there has been a larger withdrawal from less liquid markets by dealers and that electronic trading is yet to prove to be a viable model for these market segments. This is not for want of effort by companies looking to promote electronic trading. There have been a significant number of new trading platforms seeking to facilitate trading in less liquid markets. The challenge for these innovators is that the cost of information leakage in small markets is high and there are limited efficiency gains to be made, due to the small size of and limited turnover in these markets.[4] Innovations include all-to-all platforms, platforms that enable buy-side firms to respond to trade enquiries and platforms that seek to match interest anonymously.[5]

Liquidity in Australian Markets

Consistent with the global trend, liquidity in Australian bond markets, as measured by turnover, is lower now than it was in the years leading up to the financial crisis (Graph 1). Market makers have withdrawn or reduced activity from markets and generally account for a smaller share of turnover in many segments (Graph 2).[6] There has also been an increase in the concentration of market making, with foreign banks reducing their presence. As market makers in bond markets have pulled back, use of electronic trading has generally increased. Discussions with market participants in Australia indicate that electronic trading accounts for a greater share of turnover within many market segments, although it remains well below that seen in large developed markets elsewhere, including those in Europe and the United States.

One important feature of bond markets in Australia is that, in comparison to their associated derivative markets, there is significantly less market turnover. While turnover in bond markets in Australia has been declining, aggregate activity across bond and related derivative markets has been fairly steady such that the overall level of turnover in bond and related derivative markets, as a share of bonds outstanding, is around the highest level of the past 15 years (Graph 3).

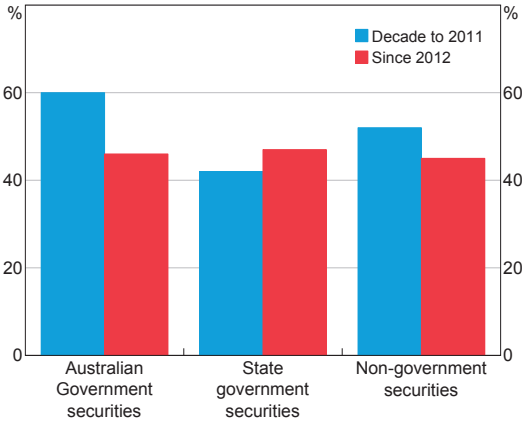
Graph 1
Annual Bond Turnover Ratios*



* Annual turnover divided by average monthly value of long-term bonds outstanding

Sources: ABS; AFMA; Austraclear; RBA

Graph 2
Dealer Share of Turnover



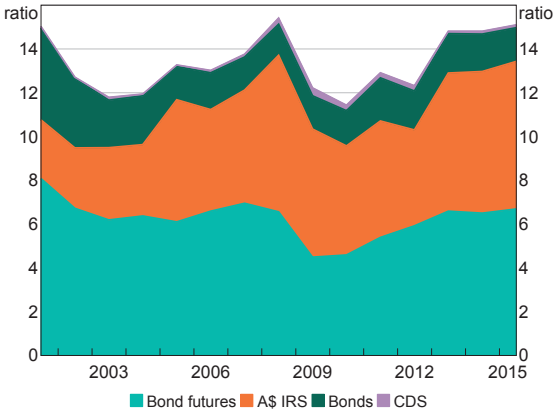
Sources: AFMA; RBA

4 Information leakage occurs if transaction information is available to participants other than those directly involved in the transaction.

5 An all-to-all platform enables a participant to transact with any other participant. A buy-side firm is one engaged with investing or buying financial services. A sell-side firm is one selling or providing financial services such as market making. A trade enquiry, such as a request for quote, is typically made to a market maker or dealer by a customer.

6 The increased dealer share of turnover in the semi-government market may be related to increases in holdings of these securities by banks that have to meet the Liquidity Coverage Ratio. For a discussion of market making, see Cheshire (2015).

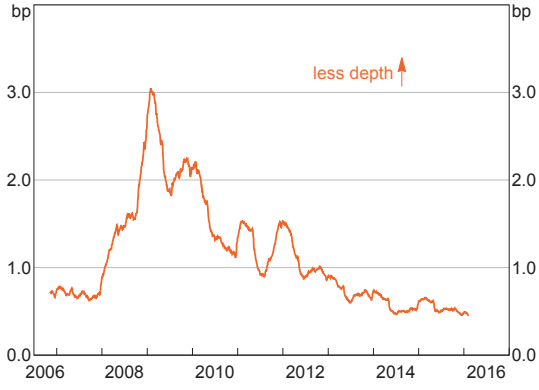
Graph 3
Australia Bond and Derivative Market Turnover Ratio*



* Annual bond, interest rate swap, bond futures and credit default swap turnover divided by government bonds and bank, corporate and mortgage-backed securities outstanding

Sources: AFMA; ASX; RBA

Graph 4
Market Depth*
Australian 10-year futures, 90-day moving average



* Basis point movement per $100 million of contracts at market value during the day session

Sources: AFMA; ASX; RBA

This development also provides some insight on the issue of the bifurcation of liquidity, whereby activity is concentrated in more liquid instruments and declining in less liquid instruments. The bifurcation of liquidity has been ongoing in Australia over a longer period of time than just the past few years. Bond futures and interest rate swaps have been used increasingly by bond issuers and investors to manage risk, rather than trading in the underlying securities. This is because these instruments are significantly cheaper to transact than physical securities.

Looking in more detail at the bond futures market, the decline in turnover and market depth that occurred in 2008/09 has been reversed. Turnover as a proportion of all bonds on issue is now at least equal to what it was in the years prior to the financial crisis and market depth in the bond futures market has also recovered to around the levels seen in the years prior to the financial crisis (Graph 4).[7] As noted earlier, HFT represents a growing but modest share of this market.

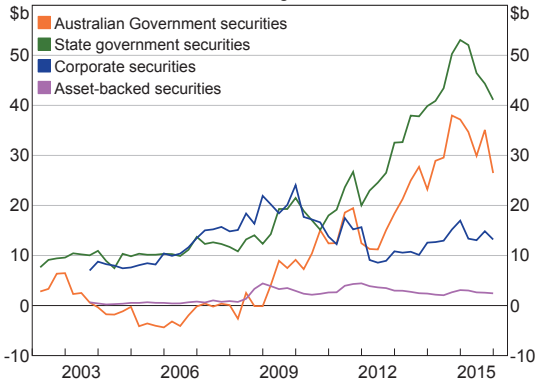
Dealer Business Models Have Changed

As outlined in the BIS report on market making (CGFS 2014), dealer activity is an important source of liquidity in fixed income markets. Since the financial crisis, dealers in many jurisdictions have reduced the size and risk of their market-making businesses. They have done this by withdrawing from these activities or reducing the amount of risk they are willing to hold. This has resulted in an overall reduction in the amount of principal-based market making that dealers undertake in many markets. Furthermore, in many of these markets it appears as though this reduction is probably long lasting: CGFS (2016) found that market-making capacity has not recovered to pre-crisis levels.

The situation is different in Australia. Here, there has not been a dramatic reduction in overall market-making capacity, measured by banks' holdings of securities, as there was in the United States and Europe (Graph 5). However, there have been significant compositional shifts, with a general reduction in risk exposure in the bonds held by market makers and a shift in inventories from foreign to domestic banks as many foreign banks reduced their activity in Australia. This change in composition has resulted in some increase in the concentration

7 For a discussion of Australian bond futures liquidity during 2012, see Lien and Zurawski (2012).

Graph 5
Australian Bank Bond Holdings
Net debt trading securities*



* Consolidated operations, selected securities
Sources: APRA; RBA

of market-making activity. This may make the redistribution of securities more difficult during periods of adjustment in markets (CGFS 2014).

One consequence of reduced market-making activity is that the cost of trading and issuing debt may increase. If market makers are unable to hold bonds until a willing buyer or seller emerges, a larger adjustment in market prices may be required to attract the next willing buyer or seller. For a bond issuer, this might mean issuing at a higher cost. For a bond holder looking to buy or sell, this might mean that they face greater transaction costs or increased market volatility.

This increase in the cost of market liquidity is a positive development to the extent that it better reflects the costs market makers face in providing liquidity. Prior to the financial crisis, risk premiums and market volatility were compressed, partly because of an oversupply of market-making services. Market makers were warehousing large amounts of risk on their balance sheets, and their activities were not supported by adequate capital or risk management practices. During the financial crisis, market makers found that parts of their business were not profitable. As a consequence, they withdrew their services and in many cases sold securities at a time when liquidity provision services were most needed. This process contributed to market stress.[8]

The regulatory reforms implemented since the crisis have sought to ensure that market makers are more resilient and are not a source of liquidity contagion in markets. The reforms have increased the cost of providing market-making services – mainly through requiring more capital and restrictions on leverage – with the aim that they are more closely aligned to the risks. The increased regulatory costs have reduced the level of activity and profitability of market-making activities, although the impact of the regulations has varied across jurisdictions and institutions. Survey information collected by the Committee on the Global Financial System (CGFS) in 2014 showed that US and UK banks reported a larger expected impact on the level of activity from the leverage ratio requirement than other banks.[9] While estimating the reduction in profitability is difficult, another more recent CGFS survey indicates that in the period prior to the financial crisis, market makers would have made a return on capital of over 20 per cent in sovereign and corporate bond trading businesses. Under the Basel III framework, the return on capital is estimated to be 8 per cent.[10] As with the first survey, results varied across jurisdictions and banks, with some assessing the leverage ratio requirement to have had the largest impact on their business and others the higher risk-weighted capital requirements (CGFS 2016, pp 19–20).

Most market makers have made changes to their business models in order to maintain their profitability. As already noted, many market makers have reduced the amount of risk they hold by

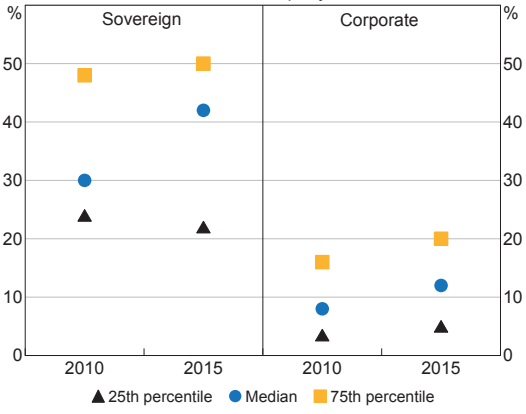
8 For a more detailed discussion of the market forces that drive the supply of market making services see CGFS (2014) and Cheshire (2015).

9 For more detail on the impact of other regulations, see Cheshire (2015) and CGFS (2014, Appendix 4: Surveying market makers on the expected impact of regulation pp 54–55).

10 The findings in CGFS (2016) were consistent with other studies in reporting that the leverage ratio requirement and higher risk-weighted capital charges were having the largest impact on sovereign bond market making businesses. Changes to the market risk framework (Basel 2.5) were reported to have the greatest impact on corporate credit market making. See PricewaterhouseCoopers (2015).

reducing their bond inventories. However, they have also attempted to raise their inventory turnover which, other things equal, boosts revenue and adds to market liquidity (Graph 6). In less liquid markets, which are generally less competitive, market makers are also targeting higher bid-ask spreads. Finally, many dealers have looked to lower the cost of market-making businesses by reducing their use of labour and increasing their use of capital. They have done this through increased use of electronic trading platforms.

Graph 6
Estimated Trading Book Turnover
Book turnover per year



Source: BIS

Electronic Trading Is Advancing

As dealers have withdrawn from principal-based market making, some have sought to replace this capacity with an agency style business with a greater share of electronic trading. This transition has enabled dealers to reduce the risk and cost of their market-making business. Costs are reduced because dealers can effectively distribute their services to a larger number of market participants and process transactions more efficiently. The greater use of electronic platforms enables dealers to reduce costs by substituting capital for labour. One way in which this is occurring in some markets is that dealers are automating more of the trading process, including the quoting and hedging of certain positions.[11]

Other market participants, such as asset managers and hedge funds, have also turned increasingly to electronic trading. In addition, in some highly liquid markets, firms specialising in automated trading (AT) and HFT have gained a significant market share.[12] This activity is discussed in more detail in the next section.

In general, there are benefits from moving to a market structure that has electronic trading at its core. Electronic trading improves market quality by lowering transaction and search costs involved in trading.[13] This can be achieved by electronic trading venues if they concentrate the trading activity within a single venue. Such venues bring together a large and diversified set of market participants by broadening market access and lowering barriers to entry. With less segmentation between market participants, there is less need for intermediaries to match buyers and sellers, and competition is increased. Price transparency is improved because trade information can be distributed more efficiently to more participants.[14]

11 For instance, algorithms can be used to generate live quotes or be used to reply to requests for quote. The use of automated and high frequency trading is discussed in more detail in Markets Committee (2016).

12 AT occurs when order and trading decisions are made electronically and autonomously. HFT is a subset of AT in which orders and trades are executed at high speeds. HFT gains an advantage from processing information on market conditions quickly. AT and HFT are used for trade execution and market making as well as being employed by firms (sometimes referred to as proprietary trading firms) to generate profits by using strategies to predict the direction of prices or arbitrage differences between prices of related instruments. These advanced forms of AT and HFT require markets which operate on central limit order books whereby outstanding orders to buy and sell a security are ordered and filled according to price and time of entry.

13 Market quality refers to the ability to transact in a market at a price that accurately reflects the value of an asset. Two components of market quality are distinguished. The ability to transact in a market is the liquidity of the market; the capacity to transact with immediacy, in volume and with little price impact. The accuracy of the price is the degree to which the price of an asset reflects all available information. For more information, see Markets Committee (2016, Box 4).

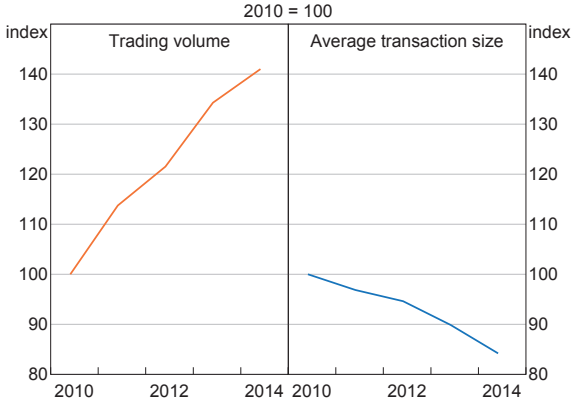
14 For a discussion of how fixed income market structures have evolved, see Markets Committee (2016).

However, electronic trading platforms have not been adopted by a number of markets. Small markets and those with low turnover or few investors may not generate sufficient economies of scale needed to make an electronic platform cost effective. Furthermore, the greater transparency of electronic platforms increases the chance that prices can move quickly against participants who enter large transactions. This creates incentives for market makers to reduce the volumes they are willing to trade at quoted prices, and for participants to break transactions up into pieces or to transact in off-market venues.

Trading activity on electronic platforms has increased significantly in recent years. A survey conducted by the BIS Markets Committee indicates that electronic trading has increased steadily across a range of markets and jurisdictions (Graph 7).[15] Consistent with the pull-back by dealers in recent years, the survey also found that there has been little growth in turnover on inter-dealer platforms. Much of the growth in electronic trading activity has been in dealer-client and in all-to-all platforms.[16] By providing an alternative, the growth in electronic trading activity has helped, at least in some markets, to offset the effect on trading activity of the decline in principal-based market making. The survey also showed that the average transaction size on electronic platforms has declined over the past five years in response to an increase in the costs of trading in large sizes.

While increased use of electronic platforms is apparent across most fixed income segments, it remains highly varied by jurisdiction and instrument. Consistent with the costs and benefits of electronic platforms described above, electronic trading is more prevalent in the largest and most

Graph 7
Fixed Income Electronic Platforms



Source: BIS

standardised markets, such as futures markets in many countries and in US and European government bond markets. It is not as prevalent in Australian government bond markets, with usage varying significantly across market participants.[17] In many bond futures markets, electronic trading accounts for around 90 per cent of transactions, a similar share as in advanced equity and foreign exchange markets. Across the fixed income landscape, many interest rate swap markets have undergone the most significant increase in the use of electronic trading platforms, driven by regulations that have mandated that trading be centrally cleared and executed. This trend is also apparent in Australia, although it is estimated that the share of electronic trading locally is lower than in major markets. The use of electronic trading platforms in less liquid markets, such as corporate credit markets and non-standardised derivatives markets, remains low because the efficiency gains are small and trading costs associated with increased transparency are greatest.

15 For more information on the survey see Markets Committee (2016). Developments in trading activity on electronic platforms in Australia are broadly consistent with the aggregate international data.

16 Inter-dealer platforms are venues that are only accessible to dealers. On dealer-client platforms trading occurs between dealers and clients but not within each of these groups. On all-to-all platforms any participant can transact with any other participant.

17 For US Treasuries and European government bonds the share of electronic trading is estimated at 60–70 per cent. In Australia, the share of Australian Government bond trading that is estimated to go through electronic platforms, based on informal discussions with dealers, ranges from 25 to 70 per cent. See Markets Committee (2016) and PricewaterhouseCoopers (2015) for survey data on the share of electronic trading in a range of markets.

Automation and high frequency trading

Along with the increase in electronic trading, there has also been a pronounced increase in AT/HFT in the liquid segments of fixed income markets. Firms employing AT/HFT models now account for the largest share of transactions in the US Treasury bond and futures markets and a large share of turnover in the German bond futures market. In Australia, AT/HFT is not as prevalent. AT/HFT has limited or no presence in most Australian bond markets and accounted for 14 per cent of Australian bond futures volumes in March 2015 up from 6 per cent in December 2013 (ASIC 2015 and Joint Staff 2015).

HFT firms gained direct access to traditional dealer markets in the United States and, as a result, have increased competition for this business and reduced market segmentation. Traditional dealers have reacted to this competition, with those that have a technological disadvantage exiting or reducing their traditional market making business, or outsourcing their market making activity to HFT firms. Others have looked to compete by employing their own AT/HFT or by matching customer orders internally rather than clearing them in the public market.[18]

The increase in AT/HFT has had an effect on liquidity in these markets, although whether this effect has been beneficial or not is a matter of contention.[19] The objective of HFT is to profit from having a speed advantage by earning a narrower margin on a very large number of small positions. Research has highlighted that HFT accelerates the process of price discovery, but results in price adjustments on lower turnover. However, some studies have found that HFT can improve many of the metrics of market liquidity, such as bid-ask spreads, market depth, volatility and the price impact of trades, at least in normal times.[20]

One concern with HFT is that it may contribute to market dysfunction during volatile periods. This may be for several reasons. One is that these firms do not have broader client relationships since they operate for their own profit through trading alone. If periods of higher volatility in markets are less profitable for them, they may withdraw their activity. In contrast, a traditional dealer often has a deeper client relationship such that it is willing to undertake loss-making activities in the short run, provided profitability returns in the medium term or that other profitable business is undertaken.

Another reason why HFT might not offer the same benefits in times of stress is that these firms do not hold trading positions for longer than a fraction of a second. In contrast, dealers that act as principal market makers have longer holding periods. When market prices are adjusting, this longer holding period is beneficial because some of the order imbalance between demand and supply is absorbed. If traditional market makers have exited the business because they cannot compete with HFT in normal times, then, when stress periods occur, there may be fewer market participants willing to absorb temporary order imbalances. With this market structure it is likely that volatility will increase.

As noted earlier, there is some evidence that markets with a concentration of activity within HFT firms have been subjected to large intraday volatility. For instance, during the flash rally in the US Treasury bond market on 15 October 2014, reduced participation by proprietary trading firms from the market was the largest contributor to the decline in market depth (Joint Staff 2015). Concentration of market activity within a group of firms that have a very short time horizon may not be a good development for markets.

A further criticism of HFT is that many trading strategies amount to manipulative or predatory trading in which the strategy is to create a misleading impression of the intended trading

18 This process is often referred to as internalising transactions and has occurred in other markets such as the foreign exchange market, see Heath and Whitelaw RBA (2011).

19 For a detailed discussion of how these trading strategies affect markets, see Markets Committee (2016).

20 See Markets Committee (2016), section 4.3 and Appendix B .

volume or induce others to trade. Again, the investigation of the US flash event found a high incidence of self-trading and order cancellations.[21] Many regulators have increasingly focused on identifying these strategies with a view to ensuring that trading strategies are not illegal (ASIC 2015).

The BIS Markets Committee's 2016 report on electronic trading noted that the increased use of automated trading poses challenges for policymakers and that it needs to be appropriately monitored. This includes ensuring that there is appropriate risk management and regulation around AT/HFT, and that trading strategies follow best practice guidelines.

Conclusion

Fixed income markets in Australia and in other countries have been going through a period of change as a consequence of a reduction in principal-based market making and an increase in the use of electronic trading platforms. While the initial cause of these changes may have been the response of markets to the financial crises in the United States and Europe, regulations subsequently introduced have brought about more change as they have sought to ensure that the provision of market making services better reflects the costs and risks associated with these activities. These developments have changed the nature of liquidity in many markets and raised questions about how robust it might be in times of stress. The impact of the changes on traditional market makers and markets in Australia has not been as great as in some other markets in the United States and Europe, where there has been an unwinding of large inventory and risk positions held by traditional market makers. The increased prevalence of electronic trading platforms and of high frequency trading firms, which have been associated with bouts of intraday volatility, has also been less in Australian markets. As a consequence, current liquidity conditions in Australian bond and associated derivative markets overall appear more robust than in some overseas markets. While there has been an increase in volatility and some risk premiums in the period since mid 2015, these measures remain below levels seen during periods of the global financial crisis. However, it is possible that current market liquidity conditions, both in Australia and globally, are being supported by generally accommodative macroeconomic and financial conditions and monetary policies that have prevailed in recent years. As these forces continue to evolve, ongoing monitoring of liquidity conditions, the advance of electronic trading, and the management of liquidity risks by market participants will be important in order to assess the ability of markets to function effectively under all conditions.

21 Self-trading occurs when the same entity takes both sides of the trade. Order cancellation occurs when trade orders are entered and cancelled in quick succession, preventing others from prioritising their trades.

References

ASIC (Australian Securities and Investments Commission) (2015), 'Review of High-Frequency Trading and dark Liquidity', Report 452, October.

CGFS (Committee on the Global Financial System) (2014), 'Market Making and Proprietary Trading: Industry Trends, Drivers and Policy Implications', CGFS Papers No 52, Bank for International Settlements, Basel.

CGFS (2016), 'Fixed Income Market Liquidity', CGFS Papers No 55, Bank for International Settlements, Basel.

Cheshire J (2015), 'Market Making in Bond Markets', RBA *Bulletin*, March, pp 63–73.

Financial Stability Board (2016), Letter to G20 Finance Ministers and Governors, FSB, February.

Heath A and J Whitelaw (2011), 'Electronic Trading and the Australian Foreign Exchange Market', RBA *Bulletin*, June, pp 41–48.

Joint Staff (US Department of the Treasury, Board of Governors of the Federal Reserve System, Federal Reserve Bank of New York, US Securities and Exchange Commission, US Commodity Futures Trading Commission) (2015): 'The U.S. Treasury Market on October 15, 2014', Joint Staff Report, July.

Lien B and A Zurawski (2012), 'Liquidity in the Australian Treasury Bond Futures Market', RBA *Bulletin*, June, pp 49–57.

Markets Committee (2016), 'Electronic Trading in Fixed Income Markets', Markets Committee Publications No 7, Bank for International Settlements, Basel.

PricewaterhouseCoopers (2015), 'Global Financial Markets Liquidity Study', August.

Currency Risk at Emerging Market Firms

Callan Windsor*

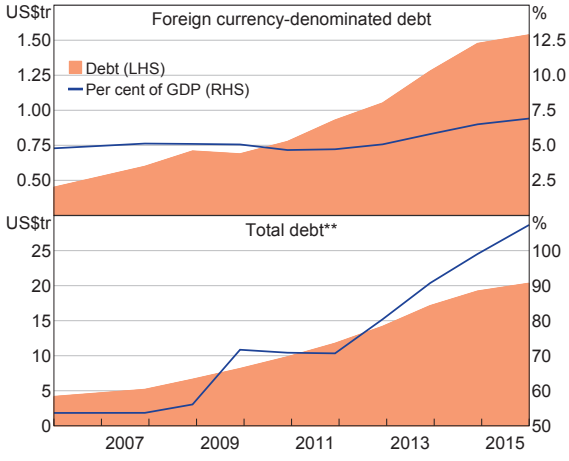
Exchange rate fluctuations can affect the value of emerging market (EM) firms in several ways, including through trade-related and balance sheet channels. This article examines the effects of exchange rate fluctuations on listed EM firms' share prices. Overall, a depreciation of the exchange rate is estimated to lower the share prices of around 25 per cent of EM firms, while 15 per cent of firms benefit and the share prices of the remaining 60 per cent are unaffected by a lower exchange rate. Among firms with share prices that are sensitive to exchange rate fluctuations, those that are more indebted tend to be more adversely affected by depreciation. However, there is no significant association between the sensitivity of a firm's share price to exchange rate fluctuations and the size of that firm's foreign currency-denominated debts, consistent with the prevalence of natural hedging among EM firms with such debt.

Introduction

There has been a substantial increase in the value of EM firms' foreign currency-denominated debt over recent years, although growth in such debt has been modest when measured as a share of GDP (Graph 1).[1] The rise in foreign currency-denominated debt has been accompanied by even stronger growth in local currency-denominated debt, such that total debt as a per cent of GDP has risen notably.

Past EM crises have led to a large body of work examining the drivers of increases in EM firms' debt and the attendant risks, including risks associated with exchange rate depreciation

Graph 1
EM Non-financial Firms' Debt*



* For the sample of 15 EMs; includes government-owned corporations

** Total debt excludes Chile, Colombia, India, the Philippines and South Africa

Sources: BIS; IMF; RBA

* The author is from International Department.

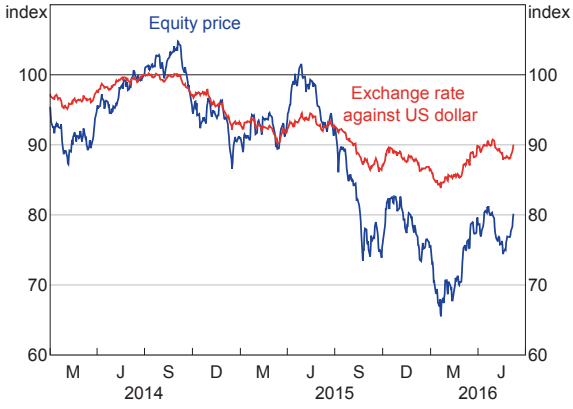
1 In this article, the term 'emerging market (EM)' refers to the following 15 markets: Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, the Philippines, Poland, Russia, South Africa, Thailand and Turkey.

(Kofanova, Walker and Hatzvi 2015).[2,3] This article focuses on the exposure of EM firms to currency risk; in particular, how firms' share prices are affected by exchange rate fluctuations.

From an aggregate perspective, these firms' exposure to currency risk (to the extent that such risks affect share prices) could be one factor behind the 20 per cent fall in EM equity prices since mid 2014, which has occurred alongside a depreciation of EM exchange rates (Graph 2). However, the correlation between equity prices and exchange rates might also reflect other factors, such as slowing economic growth in EMs, falling commodity prices and broad-based portfolio outflows, including those related to expectations of rising interest rates in the United States. Identifying the effect of exchange rate movements on firms' share prices therefore requires more careful empirical analysis.

Exchange rate fluctuations affect a firm's value (and therefore its share price) through different channels. All else equal, net importers (of either final goods or inputs into production) would be expected to benefit from a higher exchange rate (which makes imports cheaper), but exporters or import-competing firms would benefit from a lower exchange rate. However, these trade-related channels could be overlaid with possibly offsetting or exacerbating foreign currency-denominated positions: firms with net foreign currency-denominated debt positions will benefit from a higher exchange rate (all else equal), while those with net foreign currency-denominated assets will benefit from a lower exchange rate.[4]

Graph 2
EM Stock Prices and Exchange Rates
Weighted averages*; end June 2014 = 100



* Weights for each currency pair against the US dollar are equal to the relevant country weight in the equity index

Sources: Bloomberg; RBA

This article estimates the balance of these effects on individual firms' share prices by estimating exchange rate sensitivities for a large sample of listed non-financial firms within 15 EMs over the period 2000–15. For firms with share prices that are found to be sensitive to exchange rate fluctuations, the association between exchange rate sensitivities and debt is then examined.

Exchange Rate Sensitivities of EM Firms' Share Prices

In this article, exchange rate sensitivities of individual EM firms are estimated by looking at the impact of a change in the exchange rate on a firm's share price, after controlling for the return on the relevant national stock index.

This particular approach to estimating exchange rate sensitivities has two important features. First, because market information is used, these

2 Risks other than currency risks associated with the increase in EM firms' debt include: cash-flow risk (which is especially relevant for commodity producers, where recent falls in commodity prices reduce revenue, thereby increasing the likelihood of shortfalls in cash flow that leave them unable to meet interest payments); maturity-mismatch risks; rollover risks; and speculative risks (which can arise when EM firms exploit carry trade opportunities across domestic and foreign debt markets; Avdjiev, Chui and Shin (2014)).

3 The International Monetary Fund dedicated a significant part of its October *Global Financial Stability Report* to analysing the increase in debt among EM firms, its causes and implications (IMF 2015). The Bank for International Settlements has also been actively highlighting risks associated with rising debt at EM firms (Chui, Fender and Sushko 2014; McCauley, McGuire and Sushko 2015; Caruana 2016), as has the Brookings Institute and others (Acharya *et al* 2015; Obrtacova and Barrett 2013; Milne 2014).

4 The determinants of exchange rate sensitivities are more complex than this stylised description. For example, exchange rate fluctuations could simultaneously affect a firm's balance sheet, cash flows and competitiveness, and also lead to significant changes in firms' behaviour. Firms could also react to sensitivities by shifting production from one location to another. For a discussion of these interrelationships, see Bartram, Brown and Minton (2010).

estimated sensitivities should take into account natural hedges (for example, if the firm earns foreign currency-denominated revenues) and financial hedges (for example, if the firm holds financial instruments like derivatives) to the extent that these hedges are visible to investors (Bodnar and Bartram 2007). This is a useful feature of the firm-level data, as such hedges are 'notoriously hard to assess' at EM firms from an aggregate policymaker's perspective (Chui *et al* 2014). Second, controlling for the stock market index captures the confounding effects of other economy-wide factors that affect both firm values and the value of the local currency.[5] For example, a reduction in interest rates could simultaneously increase share prices (by stimulating economic activity) and lower the exchange rate, but the co-movement between share prices and the exchange rate would not imply that a firm's share price is directly affected by the exchange rate itself.

One concern with using the stock market index as a control, however, is that the resulting estimates only capture a firm's exchange rate sensitivity over and above the exchange rate sensitivity of its respective market, and not how a firm is affected by exchange rate fluctuations in an overall sense. In particular, if the market itself is directly affected by exchange rate fluctuations, then an estimated sensitivity of zero (relative to that market) does not mean the firm is unaffected by exchange rate movements.

One way to obtain an estimate of a firm's exchange rate sensitivity that can be interpreted more closely as an overall sensitivity is to control for a measure of the stock market's return that is unaffected by fluctuations in the exchange rate. In particular, 'adjusted market returns' are estimated as the residual from country-level regressions of local stock market returns on the change in the nominal trade-weighted index (TWI) (Kiymaz 2003). This 'adjusted market return' is independent of the direct impact of exchange rate fluctuations, but still controls for other economy-wide factors.

5 The change in the US dollar-denominated commodity price index was also considered as a control, but this did not materially affect the results presented below.

Specifically, the following equation is estimated separately for each firm *i* (that is, for each of the 6 300 firms in the data set) at a monthly frequency over the period 2000–15 to obtain the exchange rate sensitivity of the firm's share price:

$$Return_{it} = \alpha_i + B_i Return_t^M + E_i \Delta TWI_t + \varepsilon_{it}. \qquad (1)$$

$Return_{it}$ is firm *i*'s stock return over month *t*, $Return_t^M$ is the relevant 'adjusted market return' and ΔTWI_t is the percentage change in the relevant nominal trade-weighted exchange rate. The coefficient of interest, E_i, captures a firm's overall exchange rate sensitivity, or elasticity, such that:

1. a firm has a *positive sensitivity* if E_i is positive – in this case, the firm's share price *increases* in response to an *appreciation* of the exchange rate, or *declines* in response to a *depreciation*; and
2. a firm has a *negative sensitivity* if E_i is negative – in this case, the firm's share price *decreases* in response to an *appreciation*.

The use of the TWI in Equation (1) provides the broadest estimate of exchange rate sensitivities by capturing changes in firms' competitiveness and profitability induced by movements in the exchange rates of a country's trading partners. However, many EM firms may be primarily exposed to the US dollar through channels other than trade-related competitiveness, in particular US dollar-denominated borrowings and trade settlements. For example, about 90 per cent of Chinese firms' foreign currency-denominated borrowings are US dollar denominated. For this reason, Equation (1) is also estimated using bilateral exchange rates against the US dollar.

The sample spans 15 EMs and comprises all listed non-financial firms for which sufficient data were available to estimate Equation (1). After removing

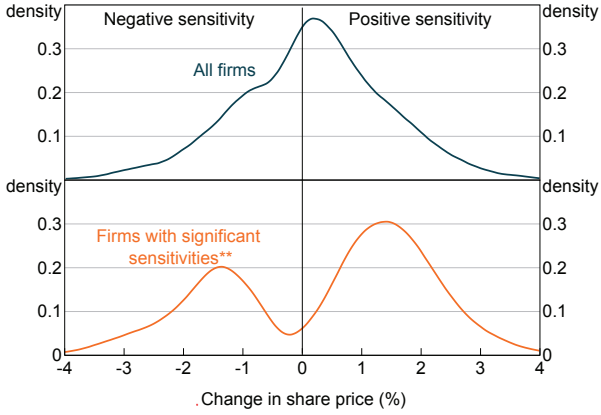
outliers, there are around 6 300 firms (Table A1).[6,7] Each EM is represented in the sample broadly according to its actual relative market capitalisation, with the exception of a significant underweighting of Chinese firms. This reflects the fact that financial firms, which are excluded from the sample, have a large weight in China's main share market index. Nevertheless, Chinese firms still make up nearly one-third of the sample.

The results provide an estimate of a firm's exchange rate sensitivity (that is, the percentage change in its share price that is associated with a 1 per cent change in the relevant TWI). For ease of presentation, the results for all firms are plotted as a distribution (Graph 3).

Across all firms there is a clear distribution in exchange rate sensitivities, which is roughly symmetric around the median firm's sensitivity, which is close to zero.[8] Some firms display large positive sensitivities, while others display large negative sensitivities: for one-quarter of firms, a 1 per cent depreciation of the TWI is associated with a *decline* in market value of 1 per cent or more (exhibit positive sensitivity), while for almost the same share of firms, it is associated with an *increase* in market value of 1 per cent or more (exhibit negative sensitivity).

For a little under 40 per cent of firms, the sensitivity of the share price to exchange rate fluctuations is statistically significant (at the 10 per cent level). Looking just at these firms, there is an asymmetric distribution, such that almost two-thirds of firms have positive sensitivities (that is, these firms' share prices are negatively affected by an exchange rate

Graph 3
EM Firms' Exchange Rate Sensitivities*
2000 to 2015; for a 1 per cent change in TWI



* Kernel density estimator
** Statistically significant at the 10 per cent level
Sources: BIS; Bloomberg; RBA

depreciation).[9] Accordingly, among firms with statistically significant sensitivities, the median sensitivity shows that a 1 per cent depreciation of the TWI is associated with a decline in market value of almost 1 per cent (Table 1). To put these figures into an aggregate context, taking the share of significantly sensitive firms (37 per cent) and multiplying it by the median sensitivity (0.9 per cent) implies that a 1 per cent fall in the aggregate EM TWI would *directly* lower the aggregate EM share price index by around one-third of 1 per cent (ignoring differences in firm size).

If the relevant exchange rate is the US dollar exchange rate rather than the TWI, a larger share of firms is estimated to be statistically sensitive to exchange rate fluctuations, at around 45 per cent. There is also a larger asymmetry in the distribution towards firms with a positive sensitivity, that is, firms with a stock price that falls as a result of a depreciation (Graph B1). The estimated median sensitivity among significantly sensitive firms in this case is therefore a little larger, with a 1 per cent depreciation of the bilateral exchange rate against

6 Most firms in the sample are present for the full 16 years, suggesting that the results could potentially be affected by survivorship bias. This notwithstanding, all of the results are qualitatively similar if the sample is split into firms that have been present for 8 years or less, versus those that have been present for at least 9 years.

7 To control for the possible effect of implausible values, the top and bottom 1 per cent of sensitivities are trimmed as well as the top and bottom 1 per cent of the balance sheet variables used later in the article (total assets, liquid assets and debt). To further abstract from the effect of outliers, medians are used to describe the resulting exchange rate sensitivity estimates.

8 These results do not change if only 'large' exchange rate fluctuations are considered, defined as exchange rate movements above the 75th percentile for a given country.

9 Using the raw market return index (rather than the adjusted market return index) as a control in Equation (1) produces a lower share of firms with significant sensitivities, as expected, with around 20 per cent of firms significantly affected by exchange rate fluctuations at the 10 per cent level of significance.

Table 1: Exchange Rate Sensitivities of EM Non-financial Firms' Share Prices[(a)]
2000–15

	All countries		China	
	TWI	Against USD	TWI	Against USD
All firms				
Median sensitivity	0.2	0.6	–1.6	–0.1
Firms with significant sensitivity				
Share of all firms (%)	37	46	41	11
Median sensitivity	0.9	1.2	–1.6	–2.4
Firms with significant positive sensitivity				
Share of all firms (%)	23	43	0	4
Median sensitivity	1.5	1.2	na	3.7
Firms with significant negative sensitivity				
Share of all firms (%)	14	3	41	7
Median sensitivity	–1.5	–2.7	–1.6	–3.1
Number of firms	6 287		1 792	

(a) Per cent change in a firm's share price associated with a 1 per cent change in the nominal exchange rate; significance calculated at the 10 per cent level using heteroskedasticity- and autocorrelation-consistent (HAC) standard errors
Sources: BIS; Bloomberg; RBA

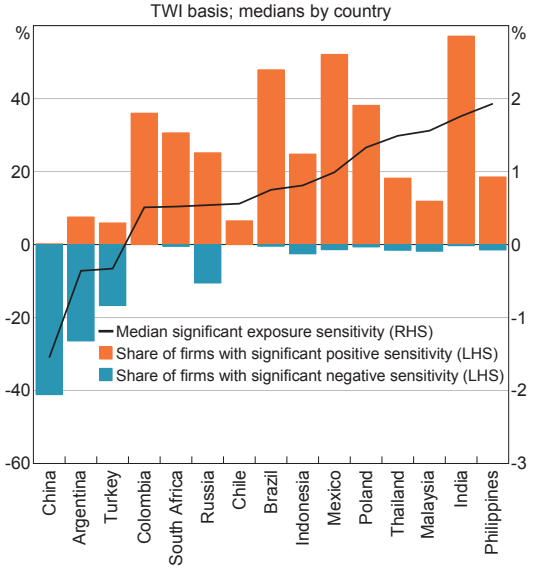
the US dollar associated with a 1.2 per cent decline in market value. Multiplying this estimated sensitivity by the share of significantly exposed firms implies that a 1 per cent fall in the aggregate EM exchange rate index against the US dollar would *directly* lower an equivalent aggregate EM share price index by around one-half of one per cent.

Chinese firms are a notable exception to these results. While around 40 per cent of firms are estimated to have statistically significant sensitivities on a TWI basis (similar to the overall results above), almost all of these firms have negative sensitivities and so these firms' share prices increase with exchange rate depreciation. In fact, Chinese firms account for around 85 per cent of all negative and significant sensitivities (on a TWI basis) in the overall sample. The share of Chinese firms with significant sensitivities to the US dollar bilateral exchange rate is much smaller. In part, this result is likely to reflect the lack of variation in the US dollar bilateral exchange rate over the sample period, which makes it difficult to identify statistically significant exchange rate sensitivities. However, it could also reflect the fact that most Chinese firms are net exporters with little US dollar-denominated debt relative to assets. Hence, they are generally more affected by trade-related competitiveness channels (which operate through a basket of trading-partner exchange rates captured by the TWI) rather than balance sheet channels (which tend to operate through the bilateral US dollar exchange rate).

Country- and industry-level sensitivities

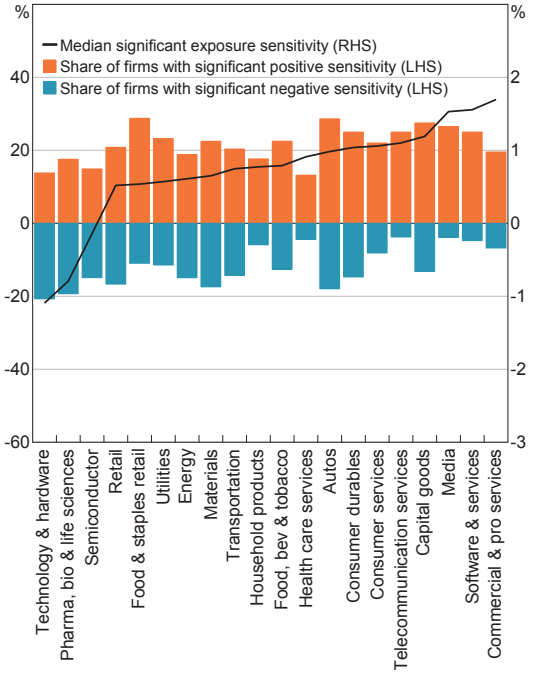
It is also possible to analyse the patterns of median exchange rate sensitivities across countries and across industries, where the median is calculated from the set of firms with statistically significant exposures (Graph 4 and Graph 5). By country, there appears to be some positive relationship between exchange rate sensitivities and the aggregate level of US dollar-denominated non-financial corporate debt outstanding (as a share of GDP). This is the case regardless of whether median exchange rate sensitivities by country are calculated using only firms with statistically significant sensitivities or using all firms. For example, the median exchange rate

Graph 4
Exchange Rate Sensitivities
TWI basis; medians by country



Sources: BIS; Bloomberg; RBA

Graph 5
Exchange Rate Sensitivites
TWI basis; medians by industry



Sources: BIS; Bloomberg; RBA

sensitivity is highest (and positive) in the Philippines, where the ratio of US dollar-denominated non-financial corporate sector debt to GDP is relatively high among the sample of EMs, whereas the median exchange rate sensitivity is negative in Argentina, where the ratio of US dollar-denominated debt to GDP is relatively small. However, the relationship between the aggregate level of US dollar-denominated non-financial corporate debt outstanding (as a share of GDP) and the magnitude of exchange rate sensitivities across all countries is not very strong, with a weak positive correlation of 0.1. Hedging could be one explanation for why the relationship between these two variables is not stronger, consistent with the role of hedging found in previous results in the literature (Dominguez and Tesar 2006).

Likewise, by industry, there are patterns that are consistent with likely trade sensitivities, but these do not appear to be strong. For example, the technology & hardware, pharmaceuticals, biotechnology & life sciences and semiconductor industries have median negative sensitivities, indicating that they tend to benefit from currency depreciation. To the extent that these are net exporting industries, this is consistent with a pattern of sensitivities due to trade channels.[10] On the other hand, service sector industries – such as commercial & professional services, software & services, media and telecommunication services – have positive exchange rate sensitivities, possibly due to these industries' reliance on imported inputs.

Exchange Rate Sensitivities and Debt

EM firms with unhedged foreign currency-denominated debt could be expected to be more adversely affected by exchange rate depreciation relative to other firms. This section examines this potential relationship by looking at the association between exchange rate sensitivities and debt

10 It is also possible, however, that these industries, which typically operate cross-country production networks (Berger-Thomson and Doyle 2013), exhibit very little sensitivity to the exchange rate because they are able to adjust operational structures geographically to adapt to exchange rate changes.

(both local and foreign currency) for those firms that have been identified as being significantly sensitive to exchange rate fluctuations. Results were also considered using the full sample of firms – with significant sensitivities or otherwise – where estimation uncertainty in the exchange rate sensitivities, E_i, was accounted for using weighted least squares. The results were consistent with those presented below, based on pooled ordinary least squares (OLS).

Importantly, the estimated relationship between exchange rate sensitivities and debt controls for country-specific characteristics, which capture factors such as a country's openness to international trade and the hedging opportunities available within its financial infrastructure. The estimated relationship also controls for firm-specific characteristics, including each firm's size and the liquidity of its assets. These firm-specific factors capture the idea that larger firms may be better placed to employ financial hedges that limit sensitivities, while more liquid firms may have partial buffers against currency risks (see Appendix C for details of the regression).

There is an estimated positive correlation between the extent of exchange rate sensitivity and total debt, implying that the share prices of companies with larger debts are more likely to benefit from a currency appreciation than depreciation (Table 2; columns 1 and 3). In terms of economic significance, an increase in the average firm's debt-to-assets ratio of 30 percentage points (equivalent to an increase in the ratio from the 25th percentile to the 75th percentile) would leave the firm's share price 10–15 basis points more sensitive to a 1 per cent change in the exchange rate.

One possible explanation for this result is that it is driven by the exchange rate effect on foreign currency-denominated debt. However, decomposing the debt-to-assets ratio into its local currency-denominated component (*LCY debt*) and its foreign currency-denominated component (*FX debt*; columns 2 and 4) indicates that the association between total debt and exchange rate sensitivities is not driven by the foreign currency-denominated component of debt (consistent with Acharya *et al* (2015) for Indian firms).[11] This result holds when considering foreign currency-denominated debt as a share of total assets in Equation (C2), as well as when

Table 2: Exchange Rate Sensitivities and Debt[(a)]
Pooled OLS results

	TWI basis		Against the US dollar	
	Total debt regression	Debt decomposition regression	Total debt regression	Debt decomposition regression
Debt	0.45***		0.30**	
LCY debt[(b)]		0.51**		0.52***
FX debt[(b)]		−0.38		−0.15
Size	−0.02	0.00	−0.04**	0.05***
Liquidity	−0.26	−0.76*	−0.12	−0.62**
Adjusted R^2	0.42	0.32	0.36	0.43
Observations	1 684	588	1 684	588

(a) ***, ** and * indicate significance at the 1, 5 and 10 per cent level, respectively; HAC standard errors; outliers excluded; coefficients on the country dummies are omitted
(b) Only includes firms in countries with available foreign currency-denominated debt data
Sources: BIS; Bloomberg; RBA

11 Decomposing total debt into its currency components does, however, limit the sample of firms with available data to those that are from Brazil, India, Indonesia, Mexico and the Philippines.

foreign currency-denominated debt is expressed as a share of total debt. These results are consistent with the finding that exchange rate sensitivities arising from foreign currency-denominated debt tend to be held by those with some degree of natural hedging (Kofanova *et al* 2015).

An alternative explanation for the finding that total outstanding debt, but not foreign currency-denominated debt, is associated with exchange rate sensitivities is that total debt may be a proxy for the riskiness of the firm more generally, rather than directly capturing the extent of balance sheet exposure to exchange rate fluctuations. For instance, an exchange rate depreciation could cause local financial conditions to tighten, as the monetary authority increases interest rates to avoid higher inflation, thereby putting downward pressure on the stock prices of more indebted firms. In addition, investors may not have timely visibility over EM firms' foreign currency-denominated debts and so indiscriminately sell down highly indebted firms' stocks following an exchange rate depreciation, regardless of the currency composition of firms' debts.

Looking at the estimates on the control variables, there is also some evidence to suggest that smaller firms and those with less liquid assets have larger exchange rate sensitivities, consistent with the idea that larger firms may have better access to financial hedging opportunities, while less liquid firms may have smaller buffers to deal with potential vulnerabilities (Dominguez and Tesar 2006).

Conclusion

There are a number of different channels through which exchange rate fluctuations can positively or negatively affect the value of EM firms. For the large sample of firms covered in this article, around 40 per cent of EM firms' share prices are estimated to be statistically sensitive to exchange rate movements, with an exchange rate depreciation lowering the value of almost two-thirds of these firms. However, among the firms with share prices that are sensitive to exchange rate changes, there is no association between the sensitivity of these firms' share prices to movements in the exchange rate and the size of these firms' foreign currency-denominated debt. Nevertheless, there is a positive association between a firm's exchange rate sensitivity and that firm's total debt, which may occur through other channels, such as the connection between exchange rate depreciation and a deterioration in risk sentiment, or the connection between depreciation and a prospective tightening in monetary policy.

Appendix A

The Sample

Table A1: Listed Non-financial Firms by EM
2000–15

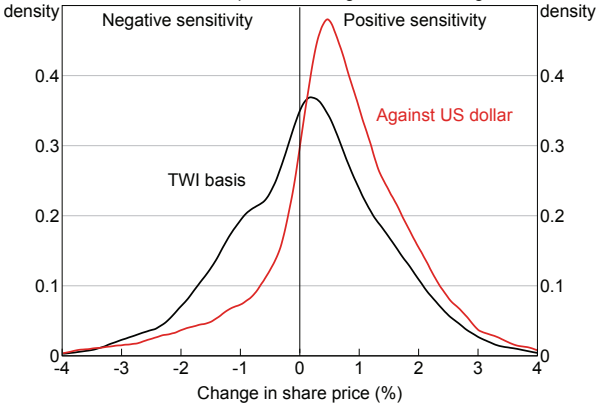
Country	Number of firms[a]	Share of all firms (%)	Actual market capitalisation US$b – end 2015[b]	Share of market capitalisation % – end 2015[b]
China	1 792	29	8 188	60
India	1 250	20	1 516	11
Malaysia	707	11	383	3
Poland	464	7	138	1
Thailand	445	7	349	3
Indonesia	355	6	353	3
Turkey	287	5	189	1
Brazil	213	3	491	4
South Africa	196	3	736	5
Russia	171	3	393	3
Philippines	135	2	239	2
Chile	123	2	190	1
Mexico	71	1	402	3
Argentina	53	1	56	0
Colombia	25	0	86	1
Total	6 287	100	13 709	100

(a) Outliers excluded by trimming the top and bottom 1 per cent of the distribution of the relevant variables in order to control for the effect of implausible values
(b) Includes financial firms; excludes investment funds, unit trusts and companies that operate only to hold shares of other listed companies
Sources: Bloomberg; RBA; World Bank

Appendix B

Additional Results

Graph B1
EM Firms' Exchange Rate Sensitivities*
2000 to 2015; for a 1 per cent change in the exchange rate



* Kernel density estimator
Sources: BIS; Bloomberg; RBA

Appendix C

Exchange Rate Sensitivities and Debt

This appendix details the regression used to estimate the association between firm-level exchange rate sensitivities and debt.

For each firm *i* of country *c* the following pooled cross-sectional regression was estimated, with all the right-hand side variables measured as of end 2014 when firm-level data on the balance sheet items are the most comprehensive:[12]

$$E_i = A_c + \Gamma debt_i + \Lambda_1 \ln(size_i) + \Lambda_2 liquidity_i + e_i. \quad \text{(C1)}$$

Here, E_i denotes the exchange rate sensitivities from Equation (1) that are estimated over the period 2000–15. The coefficient of most interest, Γ, captures the association between a firm's debt-to-assets ratio, $debt_i$, and its exchange rate sensitivity. Country-specific factors are captured by dummy variables for each country, A_c, with $\ln(size_i)$ denoting the log of each firm's total assets and $liquidity_i$ denoting each firm's ratio of cash and near-cash securities to total assets.

For the purposes of a separate regression given by Equation (C2) below, the debt-to-assets ratio was then decomposed into its foreign currency-denominated component, $FX\ debt_i$, and its local currency-denominated component, $LCY\ debt_i$. The interest here is on the coefficient γ_1 in Equation (C2), which captures the association between sensitivities and foreign currency-denominated debt.

$$E_i = \alpha_c + \gamma_1 FX\ debt_i + \gamma_2 LCY\ debt_i + \lambda_1 \ln(size_i) + \lambda_2 liquidity_i + \varepsilon_i. \quad \text{(C2)}$$

Looking at Table 2, the model using total debt can account for around 40 per cent of the variation in exchange rate sensitivities on a TWI basis. Much of that explanatory power comes from the country-specific controls used in Equation (C1). But, even after abstracting from these, over 10 per cent of the variation in the estimated exchange rate sensitivities is accounted for by movements in the balance sheet variables alone.

12 If a firm is aware of its exchange rate sensitivity, and adjusts its debts accordingly, then this raises the possibility that the association in Equation (C1) runs from exchange rate sensitivities to debt. To address this possibility of reverse causation, Equation (C1) was re-estimated using exchange rate sensitivities that were estimated over the period 2007–15 and instrumenting $debt_i$ measured in 2014 with its level at the end of 2006. The results are similar to those presented in Table 2. However, this robustness check cannot be performed for foreign currency-denominated debt due to data limitations.

References

Acharya V, SG Cecchetti, J De Gregorio, Ş Kalemli-Özcan, PR Lane and U Panizza (2015), *Corporate Debt in Emerging Economies: A Threat to Financial Stability?*, Report by the Committee on International Economic Policy and Reform, Brookings Institution and Centre for International Governance Innovation, Washington DC.

Avdjiev S, M Chui and HS Shin (2014), 'Non-Financial Corporations from Emerging Market Economies and Capital Flows', *BIS Quarterly Review*, December, pp 67–77.

Bartram S, G Brown and B Minton (2010), 'Resolving the Exposure Puzzle: The Many Facets of Exchange Rate Exposure', *Journal of Financial Economics*, 95(2), pp 148–173.

Berger-Thomson L and M-A Doyle (2013), 'Shifts in Production in East Asia', RBA *Bulletin*, June, pp 29–37.

Bodnar G and S Bartram (2007), 'The Exchange Rate Exposure Puzzle', *Managerial Finance*, 33(9), pp 642–666.

Caruana J (2016), 'Credit, Commodities and Currencies', Lecture at the London School of Economics and Political Science, London, 5 February.

Chui M, I Fender and V Sushko (2014), 'Risks Related to EME Corporate Balance Sheets: The Role of Leverage and Currency Mismatch', *BIS Quarterly Review*, September, pp 35–47.

Dominguez K and L Tesar (2006), 'Exchange Rate Exposure', *Journal of International Economics,* 68(1), pp 188–218.

IMF (International Monetary Fund) (2015), *Global Financial Stability Report: Vulnerabilities, Legacies, and Policy Challenges: Risks Rotating to Emerging Markets,* October, World Economic and Financial Surveys, IMF, Washington DC.

Kiymaz H (2003), 'Estimation of Foreign Exchange Exposure: An Emerging Market Application', *Journal of Multinational Financial Management,* 13(1), pp 71–84.

Kofanova S, A Walker and E Hatzvi (2015), 'US Dollar Debt of Emerging Market Firms', RBA *Bulletin*, December, pp 49–57.

McCauley R, P McGuire and V Sushko (2015), 'Dollar Credit to Emerging Market Economies', *BIS Quarterly Review*, December, pp 27–41.

Milne A (2014), 'Facts, Fiction and FX Vulnerabilities', Bank of America Merrill Lynch Global Emerging Markets Credit Research', 25 February.

Obrtacova K and V Barrett (2013), 'EM Corporates: Rising Leverage, Rising Risk', Morgan Stanley EM Profile, 18 November.

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

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Annual Reports

- *Reserve Bank of Australia Annual Report*
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