

# Bulletin

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RESERVE BANK OF AUSTRALIA



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# Being Unreserved: About the Reserve Bank Archives

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Photo: Reserve Bank of Australia

## Abstract

The Reserve Bank of Australia has a unique and rich archives. In addition to records about the nation's central bank, the archives contain records about Australia's economic, financial and social history over almost two centuries. The extent of the collection reflects the Bank's lineage, with its predecessor (the original Commonwealth Bank of Australia) having absorbed banks with a colonial history. Consequently, the Bank's archival collection spans convict banking records through to information about contemporary episodes in Australia's history. This article explains why the archives exist, how they are managed and plans to make them more accessible to the public.

## Introduction

The Reserve Bank of Australia is the custodian of an extensive archives about Australia's central bank, the financial sector and the environment in which they operate. To the surprise of most users of the archives, the records span nearly 200 years of Australia's history. Many of these records predate the Reserve Bank of Australia as it is known today. This article explains why the Bank is custodian of such a diverse and historic collection. It describes the nature and significance of the collection, drawing out features of some of the key series. It

discusses how the collection is managed with respect to conservation, public access and the current program of digitisation. The article concludes with a description of plans to support greater access to this asset by both the general public and researchers.

## Origins of the Collection

The origins of the Bank's collection are linked to the origins of the Bank itself and the foresight of the first Governor, Dr HC Coombs.



The Reserve Bank of Australia has operated as the nation's central bank since 1960. This follows the 'separation' from its predecessor, the original Commonwealth Bank of Australia that was established in 1911. From the time of the First World War, the Commonwealth Bank was required to develop central bank responsibilities (raising money for the war effort and subsequent peace, and full responsibility for the issue of Australia's banknotes from 1924), but by the late 1950s, acting as both a central bank and a trading and savings bank had become problematic.<sup>[1]</sup> The *Reserve Bank Act 1959* separated the commercial activities of the Commonwealth Bank from its central banking functions. The Commonwealth Bank would be renamed the Reserve Bank of Australia and would act as the nation's central bank (and hereafter 'the Bank' refers to both organisations to capture the continuity of central banking in Australia). The newly created Commonwealth Banking Corporation would operate as a trading bank. (For more details see Explainer: Origins of the Reserve Bank of Australia.)

The separation resulted in the Bank inheriting not only the central banking functions of the original Commonwealth Bank but also its archives. So why do the archives span nearly 200 years of history? This is because the Commonwealth Bank had, at key stages, been required to absorb the assets and records of earlier banks. This commenced with the NSW Savings Bank (established in 1819), which was generally known as Campbell's Bank (after colonial merchant Robert Campbell). In 1833, the business and records of Campbell's Bank were absorbed by the Savings Bank of New South Wales (established in 1832 by Governor Bourke). This bank later merged with the Government Savings Bank (established in 1871), which was in turn dissolved in 1931, with its assets and records transferred to the Commonwealth Bank by 1932 – also a government bank.

It is this lineage of government banks in Australia that gives the Bank the unusual privilege of being a custodian of colonial banking records. It also means that the Bank's archives span every major episode of the nation's economic and financial history over the past 200 years. And because economic and financial

events, along with the operation of an organisation, happen within a social context, the records also capture key periods in the nation's social history.

The records inherited by the Reserve Bank are of such value, and in good condition, largely because of the foresight and actions of Dr Coombs. Before separation, and while the Governor of the Commonwealth Bank, Dr Coombs recognised the importance of identifying, organising and preserving information so that it can inform public policy and accountability. His role in guiding Australia's post-war reconstruction, and his policy advice on achieving full employment, meant he valued accurate and comprehensive information being readily available to inform decisions.<sup>[2]</sup>

Coombs was also aware of the major Public Service Review of the late 1940s that had identified the problem of poor information management by government agencies, including the destruction of many important records.<sup>[3]</sup> With debate about the need for a separate central bank already under way, Coombs appointed an archivist to identify and manage records that would be of importance to a central bank and to the nation more generally. (See Box A: Dr Coombs and the Bank's First Archivist.)

## Nature and Significance of the Collection

The Bank's archival collection comprises a diverse set of banking records that date from the colonial era through to more contemporary activities of the nation's central bank. Their value lies in the primary source material they contain about Australia's economic, financial and social history over the best part of two centuries as well as the volume and continuity of information. This equips the Bank with a good corporate memory, a rich historical context for its operations and decisions, and it supports research and enquiry by citizens on a broad range of topics.

The Bank's colonial banking records date from the 1820s. In addition to information about businesses and other entities, they contain entries about persons. Consequently, these records are rich in social information about individual convicts, ordinary citizens and business people. They afford insights into the development of the Australian economy and financial sector in the 19th century.

### Box A: Dr Coombs and the Bank's First Archivist

In 1954, Dr Coombs appointed Jack Kirkwood as the Bank's first official Archivist.<sup>[4]</sup> Kirkwood was chosen by Coombs because of his strong corporate knowledge (he had worked in the Commonwealth Bank for many years), organisational skills, background in economics and passion for history.

One of Kirkwood's first tasks was to identify records of ongoing value, not only to the Bank but to the nation. He recommended a program of microfilming (the digitisation of its day), so that copies of the most significant or fragile records could be made available to other institutions, both to widen their access and ensure preservation copies existed outside the Bank.<sup>[5]</sup>

Recommendations for the Bank's records were compiled by an internal Bank committee. These included:

- A central repository to house all the Bank's records.<sup>[6]</sup>
- Records should remain with the Bank and near to experts (economists) who could assist in interpreting them for researchers and others.
- All records in the repository to be listed and a length of time be imposed upon them to indicate when they could be destroyed or alternatively when they became permanent.
- Access to permanent records to be approved for researchers.

Kirkwood also recognised the importance of promoting the archives. Within a few short years, the Repository had become a popular venue for showcasing records, and tours of the space were regularly given to staff, visitors and other central bankers. A quote in the Bank's staff magazine in 1958 noted that:

'On the side of public relations, too, the Archives Repository is serving to good purpose. It is now an accepted and very interesting part of the itineraries for visitors inspecting the Head Office building. Indeed the Repository is an achievement of which the Bank is proud and others envious. Officers in or visiting Sydney could profit by a visit and are assured of a welcome by the Archivist.' – *Currency*, June 1958

The principles established by Kirkwood and others continue to guide the practices of the Bank's archives today. They were also prescient in foreshadowing principles that would be established for Commonwealth government agencies by the National Archives of Australia.

They also provide details about the formation of the built environment, through records of the acquisition and sale of property and the expansion of branch networks.

The colonial collection commences in the mid-1820s with a small set of records from Campbell's Bank, but largely comprises the records of the Savings Bank of New South Wales (which operated from 1832 to 1914) and the Government Savings Bank (which operated from 1871 to 1932). The time span of the collection captures gold rushes, the 1890s Depression through to the Federation drought. The collection goes beyond the colonial era to include records from the First World War and, in the case of records of the Govern-

ment Savings Bank, the Great Depression of the 1930s. While some other cultural institutions also have colonial banking records, those held by the Bank are unusual in their scale and completeness, with a lengthy and continuous time series of information across many categories of banking business.

The records relating to the Bank are also unusual in their scale and continuity. They span the establishment of the Commonwealth Bank in 1911 through to the formation of the Reserve Bank and the recent past. Consequently, they capture over 100 years of the evolution of central banking in Australia and document the development of each of the unique functions of a central bank: govern-

ment banking; payments system oversight; market operations; monetary policy; financial stability; and banknote issuance. The way in which these functions are fulfilled is informed by the economic, financial, political and social context of the day, with archival records providing this information. The central bank records encompass major events of the 20th century, including the two world wars, international and domestic financial crises, historic swings in economic conditions, regime changes in the operation of markets (for goods, labour and assets) along with changes in the framework for monetary policy. And with deliberations by central bankers informed by the economic and financial evidence, the archives provide a comprehensive collection of data, including those that predate the provision of official statistics. How the central bank has conducted itself as an enterprise is also captured in the collection, with records providing insight into matters ranging from governance, the use of technology through to the workplace norms of different eras.

As can be expected of archives that span so many years, the records come in a variety of media and formats. While most are paper records, media range from the vellum of the oldest mortgage document, to glass plate negatives, photographs, film and audio-visual material, digital files and even metal banknote printing plates. A given medium can also come in many formats. Considering paper records alone, they take the form of ledgers, folios, pamphlets, plans, posters, vouchers and stamps through to actual banknotes (issued and unissued). Media and format are themselves additional information (or metadata) that enriches a record. The diversity of the media and format of the Bank's archival records adds to the range of enquiries that can be undertaken with them, further enhancing their significance.

### Management of the Collection

The Bank's archives have two components: all records of continuing value to the Bank and those records that have been identified by the National Archives of Australia as of continuing value to the nation. In this case, the National Archives specifies the records that should be kept permanently and

these are retained by the Bank in trust for the Australian people.<sup>[7]</sup>

In terms of scale, the Bank's archives comprise nearly 4,000 shelf metres. Owing to this scale, the conservation and security needs of the collection, and the suitability of the Bank's facilities, the Bank is one of only a few organisations that have been given dispensation by the National Archives to hold archival records on their own premises.

The archives are housed in a dedicated custom-designed repository (in a basement of the Head Office building), that complies with the standards for environmental and physical controls required by the National Archives. It has spaces and rooms with differing environmental and security controls to ensure that records are retained in appropriate conditions for their format. The Bank's archivists manage the records, so that they are preserved, controlled and access is provided as specified in the *Archives Act 1983*.

### Focus on Selected Series

While all series in the archives are significant, there are a number of noteworthy records and items that speak to the breadth of the collection.

#### Colonial banking records

The colonial banking records are a rare source of information about the financial situation of those who settled in Australia during the 19th century. The earliest record is a legal document dated 1824 relating to the sale of 100 acres of land in the District of Petersham (now inner Sydney). The land, originally granted to John Austin by Governor Lachlan Macquarie in 1819, passed from Austin to Thomas Wylde on the 2 September 1824 for the sum of '... one hundred pounds of lawful money of Great Britain ...'<sup>[8]</sup> In fact, it is one of seven documents held that relate to financial events concerning the same parcel of land during the years to 1837.<sup>[9]</sup>

The colonial banking records cover the era of convict arrivals. Contrary to the typical portrayal of convicts as penniless, many arrived with sums of money and were encouraged by the judiciary to place them in a bank including, specifically,



**Figure 1: Mary Reibey's Bank Account**

Date	Description	Debit	Credit	Balance
1833				
Aug. 26	To Col Treasurer	99 500 ..		
Dec 31	Int	111 17 13 5		
				517 13 5
1834				
Jan 1	To dr acc	517 13 5		
July 14	Int	139 7 6 7		
		157 19 4 ..		
				544 4 ..

Savings Bank of New South Wales, Sydney Head Office, Ledgers - No.1 Accounts 1-553, entry for Mary Reibey, 1833.  
Source: RBA Archives 5-1-1-1

Campbell's Bank and, from 1832, the Savings Bank of New South Wales. A significant early record held from this period is a ledger that lists the account balances of convicts arriving in the colony between 1826 and 1840, along with the name of the ship on which the convict arrived.<sup>[10]</sup>

The colonial banking records from the Savings Bank of New South Wales also contain the bank accounts of those who would become prominent in Australian society. These include the convict turned successful businesswoman Mary Reibey, who is celebrated on the current \$20 banknote, along with the accounts of the explorer Ludwig Leichhardt, the artist Conrad Martens and John Cadman (the convict who would establish a government shipping service). William Charles Wentworth (an explorer, author, barrister, landowner and statesman) and the prominent pastoralist and merchant John Blaxland, also feature as both were trustees of the Savings Bank. More generally, the colonial banking records enable examination of the establishment of households, estates and industry along with depositor behaviour in response to various types of economic events.

Figure 1 shows a ledger of the Savings Bank of New South Wales containing an entry for Mary Reibey.

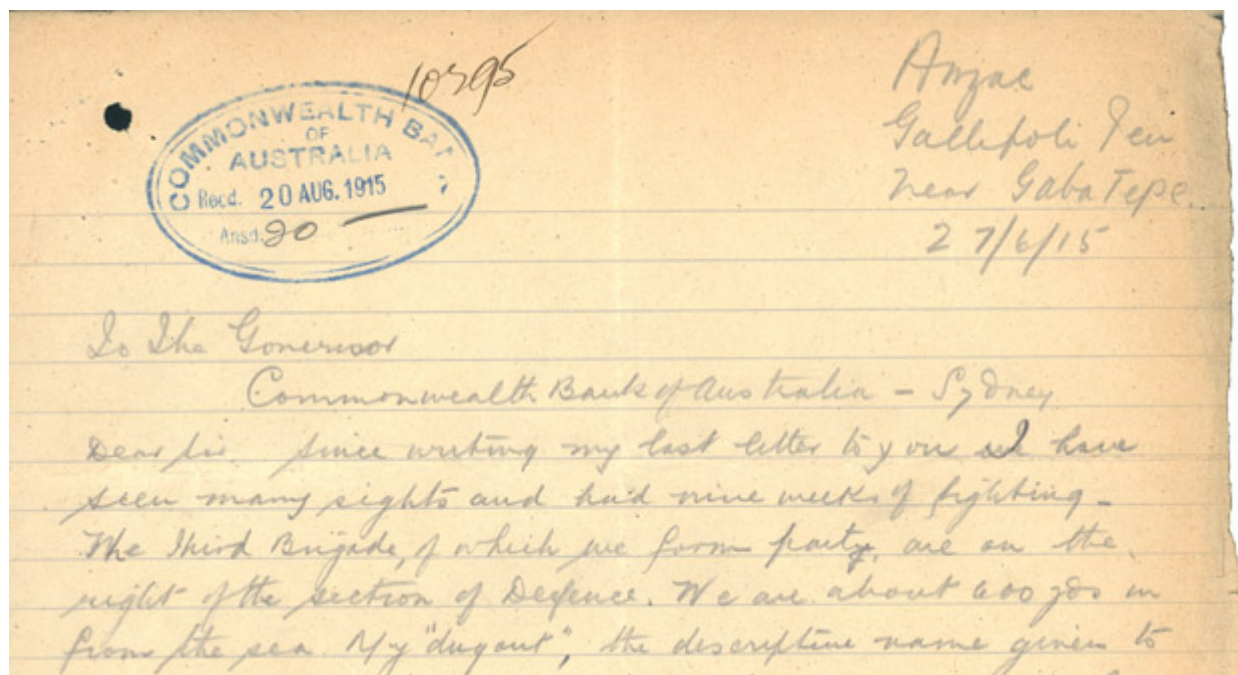
### Correspondence with the Governor

The archives contain correspondence with the Governors of the Bank since 1911. This

correspondence captures significant exchanges between the head of the central bank and the Prime Ministers, Treasurers and officials of the day, along with correspondence with staff and members of the public.

Among the most remarkable correspondence to survive are the letters sent to Governor Denison Miller (first Governor of the Commonwealth Bank) from staff serving in the First World War. Such was the relationship between the Governor and his staff that letters were sent to him from the battlefields. Staff detailed their experiences and would often conclude with good wishes for the future prosperity of the recently established institution. Figure 2 is a letter from Ernest Hilmer Smith to Governor Miller and was sent from the Gallipoli Peninsula, 27 June 1915. It gives an account of the Gallipoli landing.

While letters from staff give insight to their lives and the character of the Bank, letters from citizens give insight to the central bank governor as a public figure. The themes of these letters vary with economic conditions and correspondence comes from those in all walks of life. Among the more notable correspondents is the cricketer Sir Donald Bradman, who wrote to Governor Bernie Fraser in April 1990 to encourage him in his efforts to maintain low and stable inflation.<sup>[11]</sup>

**Figure 2: Letter from Gallipoli**

For the complete letter and a transcript, go to [From Bank to Battlefield/letters](#).

Source: RBA Archives ST-PR-22

### Glass plate negatives

The Bank has a collection of over 15,000 photographs and negatives that are of archival significance. This includes a subset of some 700 glass plate negatives that were created from 1913 when the Bank commissioned photographers to capture the construction of its Head Office and branches in towns and cities across Australia. While the focus of the photographs is on the Bank – and the anticipated role it would play as a national institution – the images capture the built environment of the early 20th century, street scenes, modes of transport, occupations, fashion and social life. The quality of images taken from a glass plate negative remains difficult to surpass, and this enabled the Bank to display them greatly enlarged on the façade of the Head Office building in Sydney in 2010 to celebrate the 50th anniversary of the Reserve Bank of Australia as the nation's central bank.<sup>[12]</sup>

Figure 3 is a glass plate negative that captures the view of the General Post Office in Martin Place (then Moore Street) in Sydney, from the roof of the Commonwealth Bank's Head Office building while under construction in 1915.

### London letters

The Bank has long had a London Office, and letters to and from London and Head Office commenced during the planning of the London Office in 1912. The records span the First and Second World Wars, the Depression of the 1930s, and other significant events of the 20th century, as a continuous series until 1975. Of particular significance are the reports written by Thomas Balogh, a prominent (and controversial) British economist, Oxford academic and advisor to British Prime Minister Harold Wilson. Balogh's fulsome reports on the state of the British and European economies were invaluable in keeping the Bank up to date on world economic and political events. They contained rich insight and data. The reports by Balogh are of particular value because detailed observations are made consistently in one voice from 1941 to 1964.<sup>[13]</sup>

### Exchange controls

Australia's Exchange Control system was introduced in 1939 and ran until the floating of the Australian dollar in 1983.<sup>[14]</sup> It controlled all transactions between Australian and foreign entities, with only authorised banks, as agents of the Bank, permitted to convert foreign currencies into Australian dollars.

**Figure 3: Glass Plate Negative Image of Martin Place Skyline, 1915**

Commonwealth Bank Head Office, corner of Pitt Street and Martin Place (Moore Street), roof construction on 8 May 1915.

Source: RBA Archives PN-000679

Similarly, approval was also required for entities converting Australian dollars into foreign currencies, for travel or business. The Bank's archives contain details of these transactions, including samples of applications for foreign currency. Of particular interest are the files in the 1930s through to the 1970s relating to entertainers, actors and professional sports people who applied to have money earned in Australia transferred to their home countries. Celebrities who visited Australia and for whom the Bank has exchange control records include Bob Hope, Sammy Davis Jr, Laurence Olivier, Louis Armstrong, Nat King Cole, Katharine Hepburn, Margot Fonteyn, Count Basie and Frank Sinatra, along with famous sporting teams and identities such as the Harlem Globetrotters.<sup>[15]</sup> The records also give insight to the development of professional sport, in particular World Series Cricket in the 1970s, with exchange controls applying to the establishment of the new cricket format and the now-famous cricketers who first played.<sup>[16]</sup>

### Banknote design

The National Archives requires the Bank to hold samples of legal tender Australian banknotes, along with the information that is central to their creation. The banknote collection includes Australian banknotes of every denomination and series, beginning with the first series of notes in 1913 through to the present day. In addition, material associated with the banknotes, such as design elements, research and reference material, are held in the archives. More recently, the National Archives has determined that milestone printing plates are also to be retained.

In addition to the issued banknotes that form legal tender, the archives contain unissued banknotes and their design elements, along with early stages and designs of banknotes that were eventually released, but often with a very different look. Of special interest are the 1966 decimal currency banknotes that were designed by Gordon Andrews. As well as design work, the archives hold items used



**Figure 4: Design Elements for the \$2 Banknote**

Banknote design elements by Gordon Andrews, including original wool and wheat used to create images on the \$2 banknote, along with early design concepts for the banknote.

Source: RBA Archives (Left to Right and Top to Bottom) NP-002025; NP-002027; NP-002830; MU-000375; MU-000364; NP-002016; NP-002831

in designing the notes, including samples of the wheat and wool that feature on the \$2 banknote. (See Figure 4.)

These banknote materials are stored securely in the Bank's archives and also in the Museum where they are on display to the general public. Digital exhibitions of them are also available on the Bank's Museum website, such as *The Decimal Revolution* which celebrates the 50th anniversary of the introduction of decimal currency in 2016.

### Public Access

The *Archives Act 1983* requires the Bank to make available to the general public those records that are in the 'open access period', defined in the Act as being 20 years after their creation. In addition to this, at the discretion of the Deputy Governor, the Bank chooses to make some information available 15 years after its creation, consistent with the Bank's goal of transparency.

The Bank's archivists act as intermediaries between those requesting access to the archives and the records. They locate information and records of relevance to the request, with this often entailing detailed research by the archivists. The Bank has a research room in which researchers and members of the general public can access the records under supervision from the Bank's archivists.

The Bank receives up to 250 requests for information from researchers each year. Reflective of the range of information, and the diversity of media and formats, research requests come from academics, postgraduate students, authors, journalists, numismatists, philatelists, genealogists and heritage architects. While a number of researchers visit the Bank in person, including from overseas, the majority of researchers are unable to do so. In this case, archives staff digitise key records that are then sent to them.

The Bank, like some other central banks, shares its records and their interpretation through official histories. Professor Boris Schedvin wrote the history

of central banking in Australia for the period 1945–75, drawing on the Bank’s archives.<sup>[17]</sup> The next instalment of the Bank’s history, from 1975–2000, is being captured in a book by the Bank’s historian, Associate Professor Selwyn Cornish of the Australian National University. His research is also facilitated by access to the Bank’s archives.

To support greater access by the public and preservation of the records, the Bank commenced a project to digitise its archival collection. Given the scale of the archives, this is a major undertaking. However, nearly one-third of the records in the open access period have already been digitised. An ongoing program of digitisation will see all records in the open access period digitised within several years, with digitisation extending to other records subsequently. Records have been prioritised for

digitisation according to their historic significance, preservation need and demonstrated demand.

At present, digitised records are sent to researchers either by email or via the Bank’s external collaboration platform. Looking ahead, there are plans to build an externally facing digital archives that will enable the public to access these records directly and conduct independent research. A dedicated digital archives will also enable much more efficient search and identification of relationships between records. Public access to the Bank’s research room will remain, with the physical properties of many records integral to their interpretation. Similarly, the assistance and research of the Bank’s archivists will continue as a core feature of the public’s access to this significant repository. ✎

## Footnotes

- [\*] Jacqui Dwyer is the Head of the Bank’s Information Department, which includes the Archives, and Virginia MacDonald is the Bank’s Senior Archivist. The authors would like to thank the Bank’s historian Selwyn Cornish for his knowledge sharing, and Information Department staff Bronwyn Nicholas, Anita Siu, Sarah Middleton-Jones, Elisabeth Grace and Carol Au for their assistance in preparing this article.
- [1] This was because the Commonwealth Bank had become both a regulator of the banks and their competitor, and there were calls to remove any perceived advantage.
- [2] Dr Coombs was appointed Director-General of the Department of Post-war Reconstruction in 1943 and was an author of the 1945 White Paper, *Full Employment in Australia*.
- [3] An account of this can be viewed in a report by Kirkwood to the Bank’s Administrative Committee in 1954 (RBA Archives SA-65-20, especially pages 27–30).
- [4] The role was advertised in the Bank’s Promotions Circular in October 1953, with Jack Kirkwood appointed to the role in January 1954 (RBA Archives COM-PC-2 – Circular Nos. 2453 and 254).
- [5] An explanation of microphotography and its role in preserving records and making them accessible is documented in Kirkwood’s report to the Bank’s Administrative Committee in 1954 (RBA Archives SA-65-20, pages 23–27).
- [6] The Archives Repository opened in 1957 in a custom designed space in the Bank’s sub-basement. This brought the Bank’s archival records together for the first time under a controlled system (RBA Archives SA-65-21).
- [7] These periods are specified in the Bank’s Records Disposal Authority, a legal instrument that specifies the length of time for which different types of Bank records should be retained (and is published on the National Archives website).
- [8] See RBA Archives 5-1M-6-5-1.
- [9] The earliest document (1824) is a legal agreement between John Austin and Thomas Wylde. The latest document (1837) is a surrender of mortgage from the Savings Bank of NSW to Samuel Augustus Perry (RBA Archives 5-1M-6-5-1 to 5-1M-6-5-7).
- [10] See RBA Archives 5-1-10-1. For further information regarding convicts and money, go to <<https://museum.rba.gov.au/exhibitions/hidden-history-banking/>>.
- [11] A copy of this letter was published in the May 1990 edition of the Bank’s staff magazine, *Currency*, along with Bernie Fraser’s reply.
- [12] For information on the 50th anniversary photographs that appeared on the Bank’s facade, go to <<https://museum.rba.gov.au/exhibitions/reflections-of-martin-place/>>.
- [13] The reports from Balogh are contained within the ‘From London’ series of letters (RBA Archives S-L).
- [14] Don Sanders (then Deputy Governor of the Bank) discussed the history of exchange control in his paper ‘Control Over Foreign Exchange Transactions in Australia’ (1984) (RBA Archives GDS-S-25).
- [15] These are contained within the Exchange Control Visiting Artists files, which date from 1939–1976.



[16] These records are held on file RBA Archives ECM-A-216.

[17] Schedvin CB (1992), *In Reserve. Central Banking in Australia, 1945-75*, Allen & Unwin, St. Leonards (NSW).

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Reserve Bank of Australia Archives B.1.1.1.C.41.3 (Banking Department - Exchange Control - Monetary Control Policy - Visiting Artists), 1956 – 1957.

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# How Do Global Financial Conditions Affect Australia?

David Jacobs<sup>[\*]</sup>



Photo: John M Lund Photography Inc – Getty Images

## Abstract

Australia is closely integrated with global capital markets. This integration has been of benefit to the economy, but also means that Australian financial conditions are influenced by developments abroad. The flexible exchange rate regime partially insulates the economy from global financial conditions. In particular, that flexibility means that monetary policy in Australia does not need to move in lock step with policies of the major central banks. However, to meet its objectives for employment and growth, the Reserve Bank can choose to offset pressure on the exchange rate from shifts in foreign monetary policies. Indeed, for much of the past decade or so, forces underpinning the structural decline in global risk-free rates have placed downward pressure on interest rates offshore and in Australia. International investors' willingness to take risk also has an important bearing on domestic financial conditions.

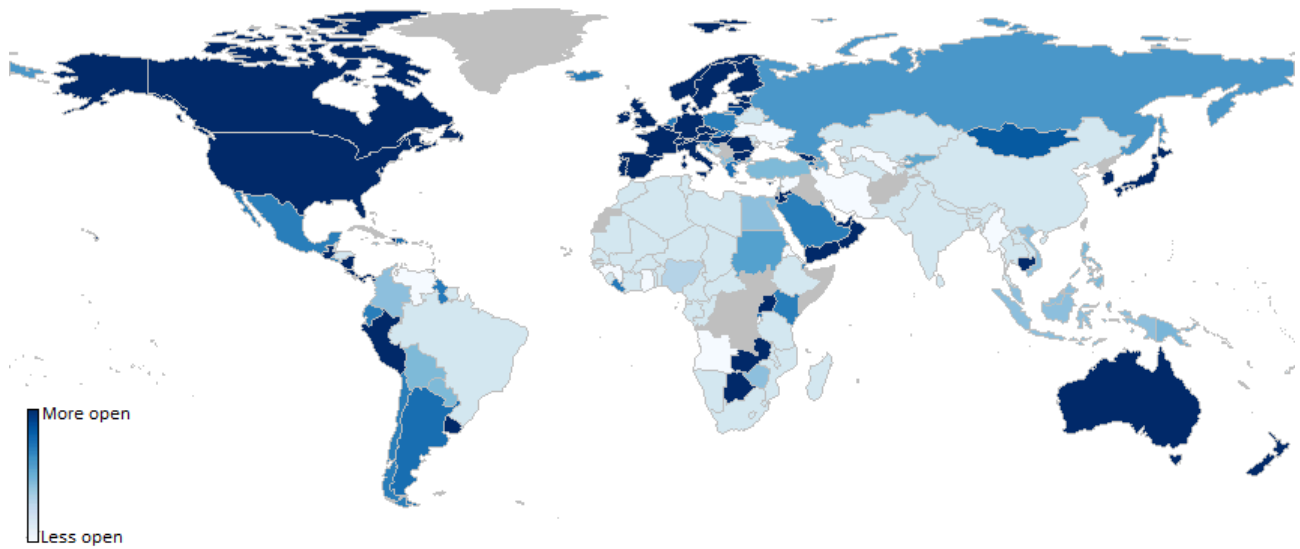
## Introduction

The Australian economy has had an open capital account ever since barriers to cross-border capital flows were dismantled during the period of financial reform in the late 1970s and 1980s. Australians are free to borrow and invest in financial assets abroad, and foreigners can do likewise in Australian markets, as is the case across many advanced economies (Figure 1). In the decades

since the Australian economy was opened, global capital markets have grown substantially. For example, cross-border assets and liabilities globally have expanded five-fold relative to the global economy in that time. Against that backdrop, there has been significant debate in international circles as to whether financial conditions in open economies such as Australia are determined foremost by developments in the global financial centres.<sup>[1]</sup>

### Figure 1: Financial Openness

Chinn-Ito Index, 2017



This article lays out the key contours of Australia’s financial linkages with the rest of the world and their implications. The first part sets the scene, sketching out Australia’s financial ties with other economies and how these are changing. Having discussed the nature of these links, the remainder of the article examines how Australia is affected by shifts in foreign financial conditions. Three major forces in international markets are (i) monetary policy settings of the major central banks, which shift interest rates over the cycle around longer-run trends, (ii) structural factors affecting those longer-run trends in interest rates, and (iii) swings in global investors’ willingness to bear risk. These forces can have differing effects on Australia through bond markets, the banking system, capital flows and the exchange rate.

#### Australia’s Integration with Global Capital Markets

##### Australia has benefited from being a net importer of foreign capital

Australia has long raised funding abroad. The economy has been a net importer of financial capital from the rest of the world for most of its modern history, recorded as deficits on the current

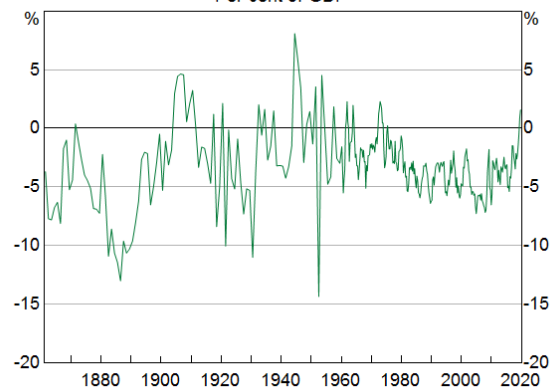
account (Graph 1). That has reflected a surplus of attractive investment opportunities in excess of Australia’s capacity to fund those via domestic savings. This external funding has been used to build productive assets, thus supporting employment and productivity, and as a result the Australian economy has benefited.<sup>[2]</sup>

This long history of importing capital means that the economy has a net liability to the rest of the world. The size of this liability relative to GDP is not dramatically different to that seen since the 1990s (Graph 2).

**Graph 1**

#### Current Account Balance

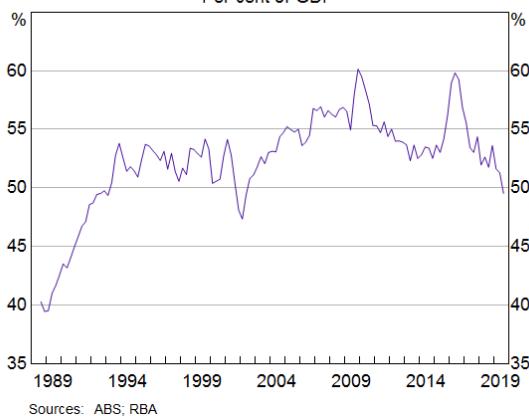
Per cent of GDP



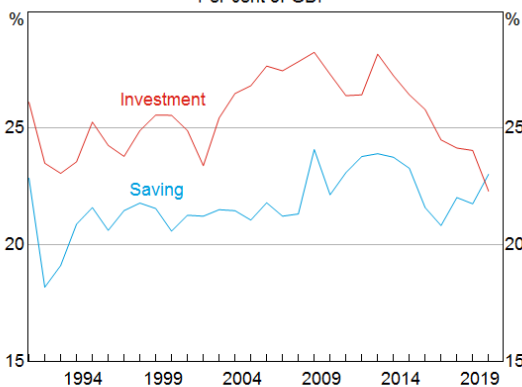
Sources: ABS; Foster (1996); Global Financial Data; RBA; Vamplew (1987)

In recent years, these net inflows of capital have declined and even reversed. In 2019, there have been net capital outflows for the first time since the 1970s – that is, a current account surplus. In large part, this shift reflects the end of the mining investment boom, as well as a decline in net borrowing by the government sector.<sup>[3]</sup> The mining boom saw high levels of investment that drew upon increased funding from abroad, despite reasonable levels of domestic saving (Graph 3). As investment has declined as a share of GDP in recent years, the economy’s net need for external capital has also fallen. As a result, net foreign liabilities have declined to their lowest levels since the early 2000s, relative to the size of the economy.

**Graph 2**  
**Net Foreign Liabilities**  
Per cent of GDP



**Graph 3**  
**Saving and Investment\***  
Per cent of GDP



\* 2019 is year to date and adjusted so that the difference between saving and investment is exactly equal to the current account position

**The economy has continued to become more ‘integrated’ with global capital markets**

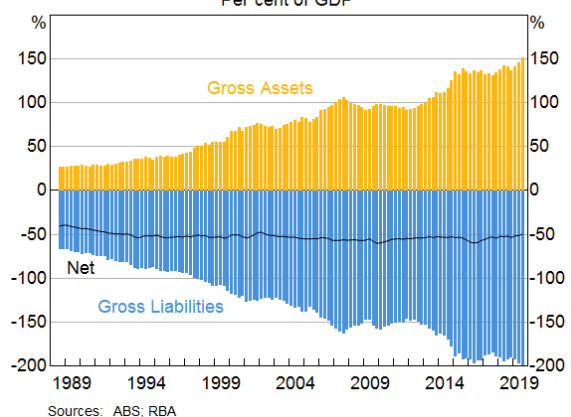
While net capital inflows have declined markedly since the end of the mining boom, the economy has continued to become more integrated with the global financial system via a growing stock of gross foreign assets and liabilities. Over the past decade, the gross liabilities that Australians owe to the rest of the world and the gross assets that Australians own abroad have both risen by roughly 50 percentage points of GDP (with assets having risen by more than liabilities) (Graph 4).

This integration is beneficial for a number of reasons. Foreign liabilities reflect Australians tapping into the deep pool of international capital to obtain funding at favourable cost. For example, Australian banks find it beneficial to raise a portion of their debt in offshore markets to access a much wider investor base than is available at home. At the same time, Australian investors, including Australia’s large and growing superannuation sector, can purchase foreign assets to diversify their portfolios. These gross positions have expanded markedly since the crisis, amid strong foreign demand to invest in Australia as well as growth in international assets of the superannuation sector.<sup>[4]</sup>

**Australia’s financial ties are strongest with other advanced economies, in contrast to our trade links**

Australia’s financial linkages remain strongest with advanced economies. For example, other advanced economies account for more than 90 per cent of

**Graph 4**  
**External Assets and Liabilities**  
Per cent of GDP





Australia’s foreign liabilities and a similar share of foreign assets (Graph 5, left panel).<sup>[5]</sup>

In turn, Australia’s direct financial links with emerging economies remain modest, despite having grown somewhat. Looking at China in particular, capital has flowed more freely across China’s borders over the past decade, at times making up a material share of net and gross capital flows to Australia.<sup>[6]</sup> But the stock of these investments accounts for only 2 per cent of foreign investment in Australia, and 5 per cent including investment from Hong Kong. That stands in contrast to our trade relationships, which are more closely tied to emerging economies; for example, China comprises nearly one-third of Australia’s exports (Graph 5, right panel).

More generally, while emerging economies make up a large and growing share of global output, they are much less integrated with global capital markets than advanced economies. Emerging economies are more likely to have maintained constraints on capital flows, and are often considered to present greater risks to foreign investors. Indeed, a key reason that Australia’s financial links have not yet deepened further with China is that it remains fairly closed financially. Mainland China’s gross external assets and liabilities sum to around 100 per cent of GDP, compared to 350 per cent for Australia.

## Key Dimensions of Global Financial Conditions

### Openness also means the economy is affected by international financial conditions

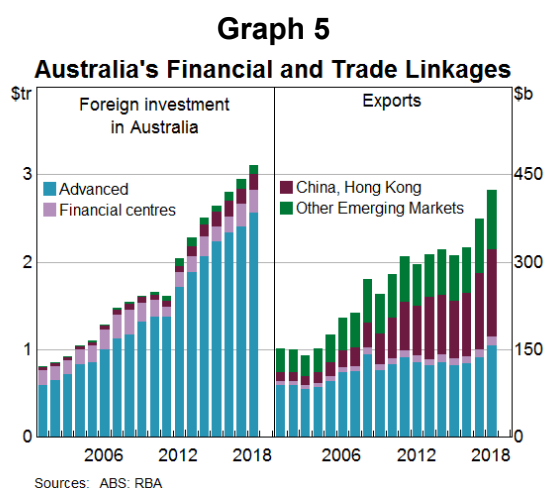
While Australia has benefited from being open to global capital markets, this also means that the economy is exposed to shifts in global financial conditions. Because Australia imports capital mainly from the other major advanced economies, which themselves tend to be financially integrated with one another, shifts in financial conditions in those economies are potentially of greatest importance. That said, Australia’s large trade links with China and other emerging economies mean that developments in these economies can still affect financial markets in Australia (as discussed below).

In the first instance, Australian firms that are raising funding offshore are impacted by a change in the cost and/or availability of funding in those markets. Another channel is via the effect of offshore conditions upon Australian markets, because capital can move relatively freely across borders. In essence, Australia’s openness to global financial markets means that prospective returns on Australian assets will tend to move towards global returns, when expressed in common currency terms (and adjusted for risk). For example, a decline in interest rates abroad would, all else being equal, see capital inflows, which in turn would place downward pressure on returns to Australian assets. That might then lead to downward pressure on domestic interest rates, thereby easing financial conditions. Or it might induce an appreciation of the Australian dollar (making Australian assets more ‘expensive’), thereby ‘insulating’ domestic financial markets from the easing in interest rates offshore.

### The major global forces are monetary policies, structural forces and risk aversion

To understand more precisely how financial conditions offshore influence those in Australia, it is useful to consider three key forces that determine the cost and availability of finance in the major advanced economies:

- a. **Monetary policies** set by the major central banks, which determine ‘risk-free’ interest rates.



These policies shift interest rates on a cyclical basis, but do so around long-term structural trends.

- b. **Structural factors** which affect those longer-run trends in risk-free interest rates.
- c. **The global appetite for risk**, as reflected in risk premiums (the additional return investors require above the risk-free rate for taking on investment risks) and the general availability of funding in major financial centres.

The following three sections consider these forces in turn. In short, the flexible exchange rate, while an essential means of adjustment, does not perfectly 'insulate' against all financial developments abroad. Rather, how conditions transmit depends on the nature of the change in global financial conditions.

### 'Cyclical' Shifts in Foreign Monetary Policy

#### Australian interest rates do not move mechanically with foreign monetary policies

Changes in monetary policies by the major central banks do not have a mechanical bearing on the cost of borrowing for Australians. There are two key reasons for this. First, Australian entities that raise funding in global markets tend to borrow either in Australian dollars directly or in foreign currencies but hedge back into Australian dollars. As a result, the cost for Australians of funding in the United States, for example, is effectively anchored to Australian dollar rather than US dollar risk-free interest rates.<sup>[7]</sup>

Second, the Reserve Bank does not need to move in lock step with foreign central banks when setting the cash rate, because the exchange rate floats. As policy rates in Australia shift relative to those abroad and capital seeks to flow towards markets offering higher (risk-adjusted) returns, the exchange rate will tend to adjust. In contrast, in economies where the exchange rate is fixed, or nearly so, central banks do need to mechanically match the policy actions of other central banks to discourage such movements of capital.

As a result, the cash rate can be adjusted as appropriate for domestic conditions. For example, during the global financial crisis, the Bank did not

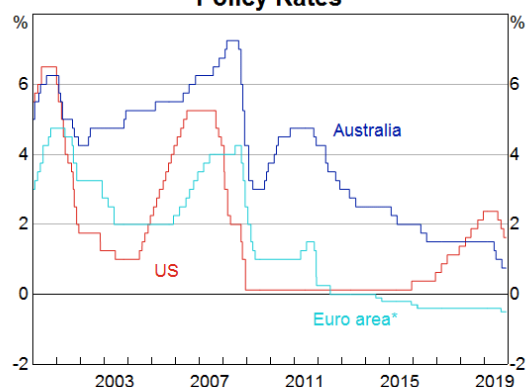
need to reduce policy rates to as low a level as central banks abroad (Graph 6). This reflected the fact that the Australian economy was relatively supported by the general resilience of our financial system (at a time when financial systems in the large advanced economies were under considerable stress) and that the exchange rate was responsive to sharp movements lower and then higher in commodity prices over this period.<sup>[8]</sup>

#### But foreign monetary policy has other influences

Changes in foreign monetary policy can, however, influence financial conditions in Australia through other channels. As noted, an easing of foreign monetary policy tends to place upward pressure on the Australian dollar.<sup>[9]</sup> All else being equal, a decline in foreign interest rates relative to Australia makes our assets more attractive for globally mobile capital. Such an appreciation is contractionary for the economy, as it makes domestic producers less competitive internationally, and so is akin to a tightening of financial conditions. Accordingly, to meet its objectives for employment and growth, the Bank can choose to offset that pressure by lowering the cash rate.

Of late, easier policy abroad has placed some upward pressure on the exchange rate, but that has been more than offset by the easier stance of domestic monetary policy. Yields on two-year Australian Government bonds, which are heavily influenced by expected monetary policy, are now around their lowest level relative to the other major

**Graph 6**  
**Policy Rates**



\* Main refinancing rate until the introduction of 3-year LTROs in December 2011; deposit facility rate thereafter  
Source: Central banks

economies in the past 20 years (Graph 7). This has contributed to the Australian dollar being at the lower end of its range over recent times, a helpful development in the context of the outlook for domestic growth and inflation.

Finally, easier monetary policy abroad can affect global risk premiums, in an offsetting direction to the effect on exchange rates. For example, easier monetary policies are likely to be pursued in order to help offset shocks that would otherwise weaken growth and push up risk premiums. The effect of global risk premiums on Australian borrowers is discussed in more detail below.<sup>[10]</sup>

### ‘Structural’ Shifts in Global Risk-free Interest Rates

There has been a secular decline in global risk-free interest rates ...

Central banks set monetary policy in response not only to the business cycle, but also underlying structural shifts in prevailing, ‘normal’ level of interest rates that are appropriate for their economies over the medium term. Over a long time span, all central banks are being affected by similar structural factors that are putting downward pressure on interest rates.

In particular, there has been a broad-based decline in risk-free rates in advanced economies over the past two or so decades. That downtrend is clearly evident in longer-term government bond yields (Graph 8). These yields are heavily influenced by

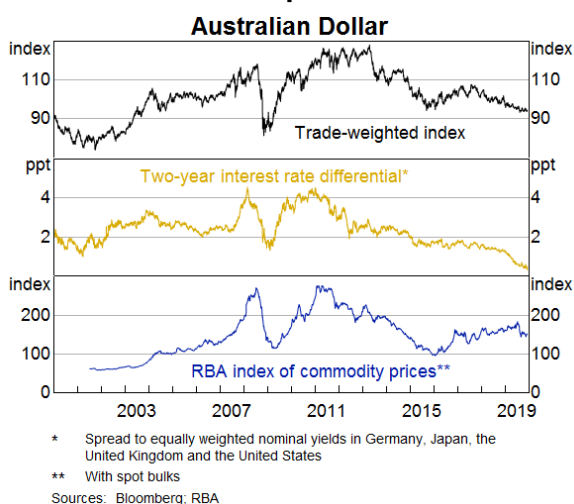
expectations for average policy settings over the years ahead and so look through cyclical swings in countries’ policy rates driven by the business cycle. Long-term bond yields have declined steadily across a number of economies not only in nominal terms, but also in ‘real’ terms (i.e. after adjusting for the decline in inflation from high levels in some economies).

This ongoing downward trend reflects longer-term structural trends globally, which are seeing an increased appetite to save and reduced appetite to invest (at any given interest rate). Such factors include demographic trends, the integration of high-saving Asian economies into the global economy, the legacy of high levels of borrowing in the past, elevated levels of uncertainty and lower rates of potential economic growth.<sup>[11]</sup>

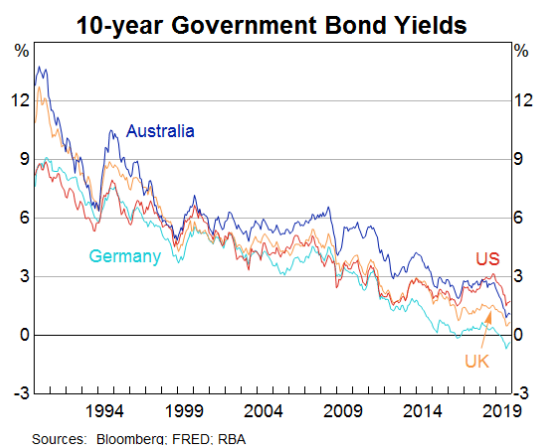
... which has influenced risk-free interest rates in Australia

These same trends have affected interest rates in Australia, reflecting our position as a small open economy. Australian monetary policy cannot influence the factors affecting global savings and investment behaviour, which are driving down global interest rates. But if the policy rate in Australia had been maintained in the face of a trend decline in global interest rates, the Australian dollar would have appreciated noticeably, which would have moved the economy away from the Bank’s goals for domestic growth and inflation. Hence, monetary policy in Australia was eased at least partly in response to the effect that a persistent decline in

**Graph 7**



**Graph 8**



global interest rates would otherwise have had on the Australian dollar (Lowe 2019a, 2019b). In addition, there has been a range of headwinds to growth and inflation in Australia and abroad, which has seen central banks respond in a similar fashion.

This situation is not unique to Australia. For example, one recent analysis has shown that 60 per cent of the movement in risk-free rates in advanced, open economies over the past few decades is explained by structural shifts, which in turn have a large global component (Jordá and Taylor 2019).

## International Risk Aversion

### The global appetite for risk also influences global financial conditions

Separate from policy rates, financial conditions in international markets are heavily influenced by the willingness of investors to take on risks. When investors perceive risks to have risen (either globally or in a particular economy), they will require a higher return to compensate for that risk – that is, a higher premium relative to risk-free rates. They may also become less willing to lend in as large a quantity as previously, and even curtail lending to very risky borrowers.

How might a rise in international risk aversion spill over to Australia?

- First, Australian banks and corporations would face higher costs of funding in international markets, and at the extreme they might be unable to raise as much funding. While borrowers can hedge against movements in risk-free rates abroad (and exchange rates), these hedges do not insulate them from risk premiums in international funding markets.
- Second, Australian entities might attempt to replace that funding abroad by raising more equity or debt in Australian markets. That additional demand will tend to increase the cost of those funds in the domestic markets, which are not as deep as those offshore. That would contribute to a rise in the cost of borrowing in Australia, over and above the domestic risk-free rate.

### Australian risk premiums move with those in advanced economies, even with the flexible exchange rate

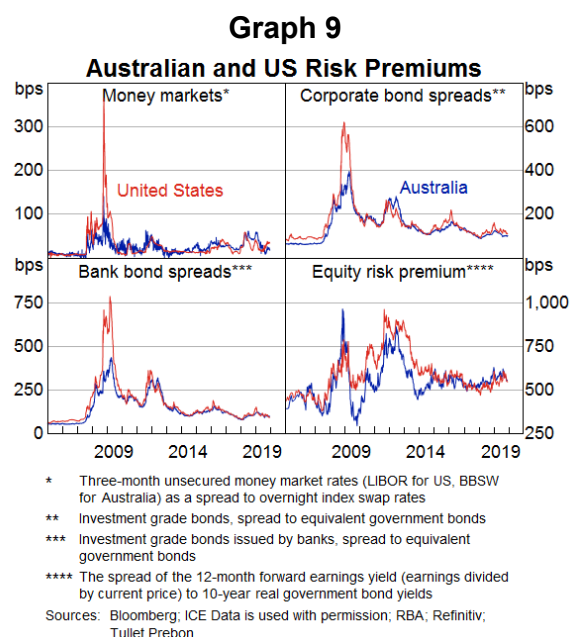
Reflecting these links, during periods in which international investors become more concerned about risks, there tends also to be a rise in risk premiums in Australia. For example, measures of risk premiums in Australian markets for bonds, equities and short-term money move very closely with those in the United States (Graph 9).

Accordingly, having a flexible exchange rate does not fully insulate the economy against these swings in international risk aversion. Again, this experience is not unique to Australia. An extensive literature has shown that these shifts in risk aversion spill across a wide range of economies, including others with flexible exchange rates.<sup>[12]</sup>

### Australian asset prices have not tended to move as closely with those in China, though this is shifting

The effect of financial links is seen in the fact that Australian and US risk premiums move so closely. Indeed, risk premiums in Australia have moved more tightly with those in the United States than would be expected based purely on the fact that the Australian and US economies are at times in a similar phase of the business cycle.

The flipside is that Australian asset prices do not move as closely with Chinese asset prices as they do



with US asset prices, despite our deep trade linkages with China (Graph 10). That said, developments in China still matter for financial conditions in Australia, via the ‘confidence effects’ they have on Australian financial prices. Indeed, these appear to have strengthened over time. This is seen in the rising – even if still somewhat low – correlation between Australian and Chinese risk premiums (as well as exchange rates and risk-free rates) (Graph 11).<sup>[13]</sup> As China becomes more interconnected with the global financial system these links could be expected to strengthen further.

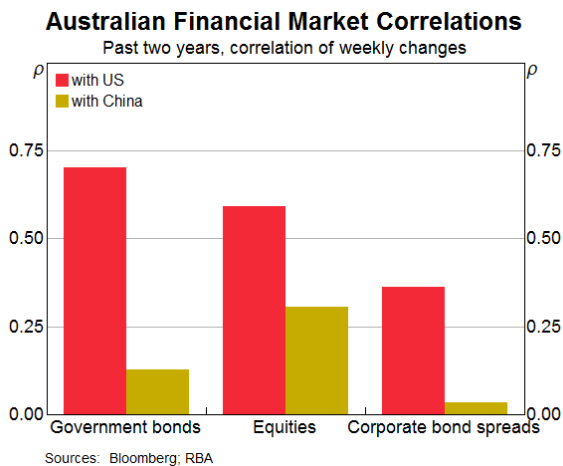
**In the extreme, funding may also become more difficult to obtain in international markets**

Of late, risk aversion in international financial markets has been low, as indicated by narrow risk premiums across a range of asset classes. However,

history has shown that lengthy periods of benign financing conditions can sometimes be followed by abrupt increases in risk aversion, although specific triggers for these types of episodes are difficult to predict. For a very short period (about a month) during the height of the global financial crisis Australian banks did not access funding markets offshore.<sup>[14]</sup> Notwithstanding that extreme but short-lived episode, there are a number of factors that help to protect Australia during bouts of severe risk aversion.<sup>[15]</sup>

In part reflecting those mitigants, the sizeable risk premium that financial markets applied on Australian assets for much of the 1980s and 1990s compared to our international peers has since diminished. That can be seen in comparing real (inflation-adjusted) bond yields in Australia to other major advanced economies over the past four decades (Graph 12).<sup>[16]</sup>

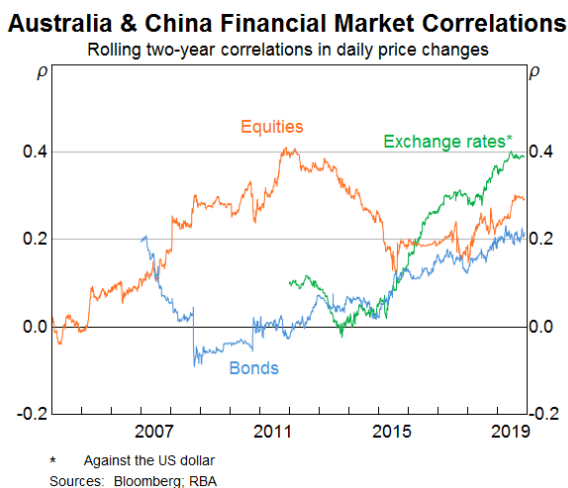
**Graph 10**



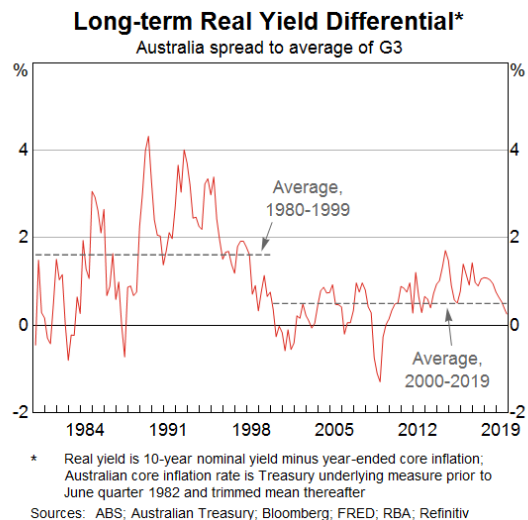
**The flexible exchange rate still provides an important shock absorber**

Periods of increased risk aversion are typically associated with a depreciation of the Australian dollar (partly because commodity prices also tend to decline). While such a depreciation might not completely insulate against global risk aversion, it would still adjust to a significant extent for any decline in international demand for Australian dollar assets.

**Graph 11**



**Graph 12**





Indeed, an important feature of Australia's economy is that it is able to withstand, and moreover can be aided by, sharp depreciations of the Australian dollar. A depreciation boosts net trade by making Australian producers more internationally competitive (the 'trade channel'). In addition, a depreciation of the Australian dollar does not hurt Australians that are funding abroad, including the Australian banks. That is because they tend to raise funds in Australian dollars or hedge the exchange rate exposures associated with borrowing in foreign currencies. As a result, Australians' offshore borrowing needs actually decline (in foreign currency terms) when the exchange rate depreciates. Moreover, Australians receive net inflows from counterparties on their currency hedges when the Australian dollar depreciates; in the global financial crisis, these inflows were sizeable.<sup>[17]</sup>

In contrast, for countries where funding is primarily in foreign currency and unhedged, a depreciation requires borrowers to use more local currency to repay existing offshore debts. That can impair the balance sheets of banks and firms who have borrowed abroad, resulting in an adverse 'financial channel' that counteracts the benefits of the trade channel following a depreciation.

Australians can issue liabilities in their own currency because foreigners are comfortable holding exposure to the Australian dollar. In part, that has reflected favourable risk-adjusted returns and diversification benefits. But it has also reflected other factors: the Australian dollar is liquid, convertible and does not pose risks of debasement thanks to a credible inflation target. Indeed, the Australian dollar has remained the fifth most traded currency globally in recent years (Guo, Ranasinghe and Zhang 2019). International investments in Australian dollar assets are also made in the context of strong domestic legal protections.

Relatedly, a deep hedging market is important in ensuring that Australians can borrow abroad without being exposed to movements in the exchange rate (or foreign interest rates). The depth of this market is underpinned by a range of 'natural' counterparties that are looking to lend Australian dollars via hedging contracts. A substantial rise in

hedging costs would increase the cost of raising funds offshore for many entities, while a disruption to the functioning of the swap market would impair the ability to roll over hedged foreign currency debt. That said, the fact that Australian borrowers tend to hedge the full maturity of their offshore debt, and primarily use these markets to fund Australian dollar (rather than foreign currency) assets, means that they are less exposed in the event that there is such a disruption.<sup>[18],[19]</sup>

### Funding with equity and long-term debt reduces funding needs during such squeezes

Even with a depreciation of the exchange rate, Australian borrowers abroad could be affected by a drying-up of funding in global markets. The fact that net capital inflows are currently low (or indeed negative) would be of some help in such an event. Even so, these net flows can shift quickly as economic conditions change, and a lesson from earlier crises abroad is that gross as well as net funding needs are important when assessing how events abroad might transmit. For example, those banks or businesses that are overall borrowers in international markets may not be able to obtain funding provided by other Australians who are accumulating foreign assets (such foreign equities purchased by superannuation funds). This can impede their ability to obtain new funding on favourable terms, as well as make it more difficult for them to roll over existing debts as they mature.

However, much of Australia's gross offshore funding is in forms that do not need to be rolled over frequently, so are less vulnerable than otherwise to a sharp rise in investors' risk aversion. In particular, a large share of foreign liabilities are in the form of equity (about 40 per cent), which does not need to be rolled over in the way that debt does (Graph 13). For example, there have been large foreign equity investments in the mining sector in recent years, although equity funding was widely used even prior to the resources boom. Also, debt liabilities have been issued with longer-term maturities over recent years. Short-term debt – that which falls due within a year – has fallen from half of Australia's gross foreign debt in the early 2000s to about one-third today (Graph 14).

If the resources investment boom had instead been funded by short-term foreign debt, rather than equity, the external funding risks to that sector would now be much greater. A sharp fall in commodity prices amid weaker global growth could see investors quickly curtail their funding to mining companies given a weaker outlook for profits. In contrast, we might now see a fall in the value of equity owned by foreigners, but that does not pose a risk either to the cost or the volume of funding of the long-term assets in the sector.

**And sound institutions helps the economy to weather bouts of severe risk aversion**

History also shows that Australia’s access to foreign markets is supported by a range of institutional features. In particular, investor confidence is

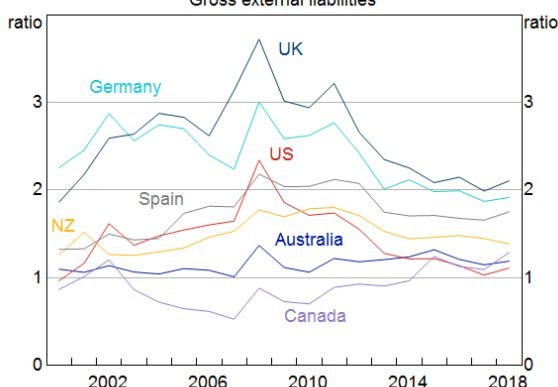
supported by credible macroeconomic stabilisation policies as well as a resilient financial system, characterised by deep financial markets and well-capitalised financial institutions. The ability of the Australian banking system to withstand shocks has been strengthened since the financial crisis, with higher capital ratios, improved lending standards, and a shift to more stable forms of funding and increased holdings of liquid assets. Australia has maintained its high credit rating, even as many of its peers have been downgraded over the past decade. Indeed, foreign creditors have never suffered from any defaults on the debt of the Australian sovereign, which is true for only a small group of countries.

**Conclusions**

While the Australian economy has benefited greatly from being closely integrated with global capital markets, that openness means that the domestic economy is affected by shifts in global financial conditions. The flexible exchange rate regime partially insulates the economy from financial conditions abroad; monetary policy can attend to domestic conditions and does not need to move in lock step with cyclical shifts by the major central banks. However, other things being equal, a decline in policy rates abroad would tend to see global capital flow towards Australia, thereby contributing to an appreciation of the Australian dollar. To meet its objectives for employment and growth, the Bank can choose to offset that pressure by lowering the cash rate, and has broadly done so for much of the past decade or so as there has been a trend decline in risk-free interest rates across advanced economies for structural reasons. In the event of a sharp rise in investor risk aversion abroad, Australian borrowers would be affected, although a number of features of our financial system would help to mitigate those effects. These include the flexible exchange rate alongside the nature of our external financing, including the fact that Australians fund in Australian dollars or are well hedged. ✖

**Graph 13**

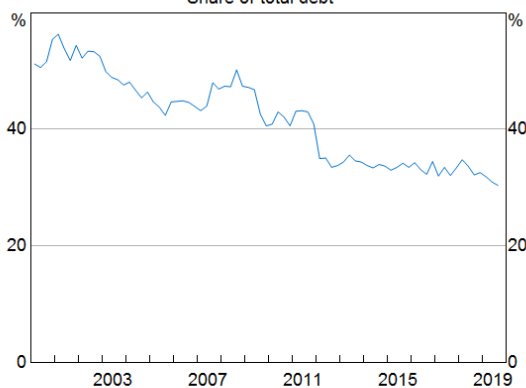
**Ratio of Debt to Equity\***  
Gross external liabilities



\* Equity includes all foreign direct investment (FDI)  
Sources: IMF; Lane and Milesi-Ferretti (2017); RBA

**Graph 14**

**Short-Term Foreign Debt\***  
Share of total debt\*\*



\* Short-term if debt has residual maturity of less than one year  
\*\* Short-term and total based on gross liability debt positions  
Sources: ABS; RBA

## Footnotes

- [\*] The author is from International Department, and thanks David Halperin, Isabel Hartstein, Emma Smith, Peter Wallis and Max Wakefield for their help in preparing this article.
- [1] For example, see Rey (2013), Miranda-Agrippino and Rey (2015) and Obstfeld (2015).
- [2] See Belkar, Cockerell and Kent (2007) and Debelle (2011).
- [3] See Debelle (2019).
- [4] A larger stock of gross positions does not necessarily mean larger gross flows; as discussed below, there has also been a shift away from shorter-term forms of finance that need to be rolled over more frequently.
- [5] This figure includes international financial centres.
- [6] These have primarily been of three forms: direct investment in Australian businesses; reserve holdings of Australian Government debt; and banking flows via Chinese banking affiliates to fund business investment. For a more comprehensive discussion of China's financial links with Australia, see Kent (2019).
- [7] This issue is discussed in greater detail by Kent (2018).
- [8] See Debelle (2018) and Stevens (2009).
- [9] The effect on the exchange rate might also be magnified where global growth expectations and commodity prices increase in response to easier monetary policy in major economies.
- [10] In broad terms, the effects for Australia of shifts in unconventional policy abroad are the same as those of conventional policy, including that both have effects via the exchange rate and risk premiums.
- [11] See Lowe (2019a, 2019b). A large literature has examined secular trends in the global real interest rate; e.g. see Rachel and Smith (2015).
- [12] See Rey (2013), Miranda-Agrippino and Rey (2015) and Obstfeld (2015).
- [13] The exchange rate in particular has become more correlated with the renminbi as the latter has become more flexible over time.
- [14] Following the collapse of Lehman Brothers, the move by the Australian Government to guarantee wholesale funding and (up to a limit) deposits of banks regulated by the Australian Prudential Regulation Authority was mostly a response to similar support measures enacted by other countries. It was not obvious that Australian banks ever lost access to funding during the global financial crisis. Rather, the reduction in debt issuance by Australian banks over this period was more of a reflection that they were not prepared to pay the higher costs for funding that were being demanded by lenders around this time. See Debelle (2018).
- [15] Also see Debelle (2011, 2014 and 2019).
- [16] While these are real yields, part of the differential in prior decades may have still reflected a higher inflation risk premium for Australian-dollar assets.
- [17] See Bellrose and Norman (2019) for further discussion of the Australian banks' offshore funding.
- [18] See Berger-Thomson and Chapman (2017).
- [19] The fact that Australian entities are ultimately looking to source Australian dollars, and thereby lending US dollars in the swap market, means that they would not be vulnerable to a shortage of US dollars in the swap market as occurred during the financial crisis. Moreover, in the event of a severe disruption, the Reserve Bank is ultimately the source of Australian dollars and so can provide a liquidity backstop. That differs from the situation in parts of Europe and Asia, where banking systems fund large US dollar asset positions, including by borrowing US dollars via the swap market.

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# A Cost-benefit Analysis of Polymer Banknotes

Max Wakefield, Luc Delaney and Richard Finlay<sup>[\*]</sup>



Photo: Parinda Yatha – Getty Images

## Abstract

Australia was the first country to issue a full series of polymer banknotes, completed over 1992–96. After 25 years, issuance of the second generation of polymer banknotes is well advanced. It seems appropriate, therefore, to revisit the financial savings resulting from the switch to polymer. Employing a cost-benefit analysis framework, we find that the switch to polymer has resulted in net savings of close to \$1 billion over the past 25 years in inflation-adjusted terms. This does not take account of the benefits of reduced counterfeiting, which have also been substantial and were the original motivation for switching to polymer. We also discuss cost savings arising from outsourcing banknote distribution to the private sector, as well as seigniorage income which accrues from banknotes on issue and which ultimately flows to the Australian Government as non-tax revenue in the form of the dividend payment from the Reserve Bank.

## Introduction

Australia was the first country to issue a full series of polymer banknotes, completed over 1992–96. After 25 years, issuance of the second generation of polymer banknotes is well advanced. This presents a good opportunity to revisit the financial savings resulting from the switch to polymer.

The cost of printing polymer banknotes is generally higher than for paper banknotes, since polymer

substrate costs more than paper. However, polymer banknotes have a much longer lifespan than paper banknotes – which in Australia’s case tended to wear out after six months to a year – potentially reducing transport, processing, destruction, and production costs over time (Graph 1; paper life shown in lighter colours on the left). So while the initial motivation for developing polymer banknotes was to enhance security, there were also durability benefits which can result in lower overall cost. This



article seeks to quantify these potential benefits.<sup>[1]</sup> The issuance of banknotes – regardless of the substrate they are printed on – also usually results in seigniorage income which ultimately flows to the government. Box A explains seigniorage and provides some estimates for Australia.

### Cost-benefit Analysis Framework

The cost-benefit analysis framework used in this article is based on Bouhdaoui, Bounie and Van Hove (2013). The framework has two components: the ‘upgrade’ or ‘up-front’ cost of replacing all old-series banknotes (this is the initial cost of upgrading, and it can be significant); and the ongoing annual savings in production and other costs. The break-even point is when the sum of annual savings equals the migration cost.

Old-series Australian banknotes remain legal tender in Australia and can continue to be used. However, when upgrading a series, the Bank has historically sought to remove old-series banknotes from circulation and issue new banknotes to meet demand. This is a policy choice, and we could alternatively allow multiple series to co-circulate.<sup>[2]</sup> Given this approach, the Bank also has to replace banknotes held as contingency stocks, where we assume that the contingency buffer is set as sufficient to cover one year’s worth of additional banknote demand. (Given that it takes some time to print new banknotes, central banks typically hold extra stock in case demand for banknotes suddenly

surges or normal production is disrupted.) For  $N_t$  representing the number of banknotes in circulation at time  $t$ ;  $c_p^{polymer}$  the cost to produce polymer banknotes;  $c_d$  all costs associated with processing and destroying old banknotes (which for simplicity we assume are the same irrespective of substrate); and  $d_t$  representing banknote life (so that a  $1/d_t$  share of banknotes wear out each year), banknote upgrade costs will be given by:

$$C_m = N_0 \cdot \left[ c_p^{polymer} \left[ 1 + \frac{1}{d_0^{polymer}} \right] + c_d \left[ 1 + \frac{1}{d_0^{paper}} \right] \right] \tag{1}$$

Here the first term captures the cost of printing sufficient new polymer banknotes to replace all circulating banknotes plus those held in the contingency buffer, while the second term captures the cost of destroying existing paper banknotes (both those in circulation and those held as contingency).

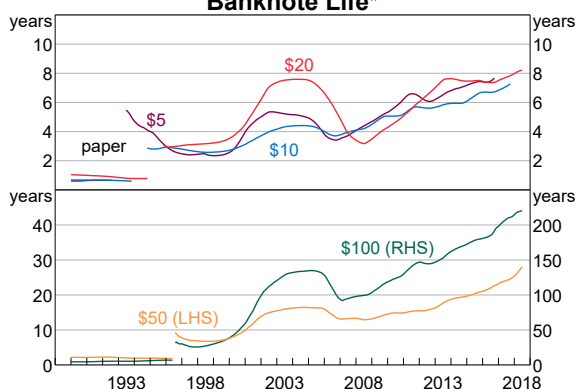
Next we consider annual savings. Each year: old, worn-out banknotes will need to be replaced with new banknotes; additional new banknotes will need to be printed due to growth in overall banknote demand; and banknote contingency stocks will need to be topped up to account for growth in banknote demand. Accounting for each of these, the difference in annual replacement costs of polymer versus paper  $t$  periods after transition is given by:

$$C_d(t) = N_{t-1} \left[ \frac{c_p^{polymer} + c_d}{d_{t-1}^{polymer}} - \frac{c_p^{paper} + c_d}{d_{t-1}^{paper}} \right] + (N_t - N_{t-1}) \cdot (c_p^{polymer} - c_p^{paper}) + c_p^{polymer} \left[ \frac{N_t}{d_t^{polymer}} - \frac{N_{t-1}}{d_{t-1}^{polymer}} \right] - c_p^{paper} \left[ \frac{N_t}{d_t^{paper}} - \frac{N_{t-1}}{d_{t-1}^{paper}} \right] \tag{2}$$

Here the first term represents the difference in replacement costs for existing banknotes that wear out; the second term represents the difference in the cost of printing new banknotes to meet increased net demand; and the third and fourth terms represent the difference in the cost of topping up the contingency buffer.

The total cost or gain from switching to polymer is the up-front upgrade cost as given by Equation (1), plus the sum over each period of the difference in annual replacement costs, as given by Equation (2).

**Graph 1**  
**Banknote Life\***



\* Five-year-ended average; initial data are paper, later data are polymer; excludes periods when issuance of new series banknotes materially affected data; banknote distribution arrangements were changed in the early 2000s, resulting in a large stock of new banknotes entering circulation and temporarily boosting estimated life

Source: RBA

## Data and Modelling Results

### Costs, prices and banknote life

To conduct a fair cost-benefit analysis we should compare the cost of printing polymer banknotes with the cost of printing otherwise similar paper banknotes. It has been around three decades since the Reserve Bank has ordered paper banknotes, however, and had Australia stayed with paper, then our previous paper series, first issued in 1966, would almost surely have been upgraded over that period. Reflecting this, we use publicly available banknote cost estimates from the Bank of Canada, which switched from paper banknotes to polymer banknotes over the period 2011–13, rather than out-of-date Reserve Bank figures. In particular, Bank of Canada (2018) estimates that the last paper series of Canadian banknotes cost CAD 10 cents per banknote to print (around AUD 11 cents); the first polymer series of Canadian banknotes cost CAD 23 cents per banknote to print (around AUD 25 cents); and the latest polymer series of Canadian banknotes cost roughly 20 per cent more per banknote to print at CAD 27 cents (around AUD 30 cents). In the analysis that follows we use AUD 25 cents as the assumed cost of polymer banknotes, and AUD 13 cents as the assumed cost of paper banknotes (being the final Bank of Canada paper banknote cost of AUD 11 cents, increased by 20 per cent to reflect a higher cost for a counterfactual upgraded paper banknote series). We assume that all-in unit processing and destruction costs are roughly 10 cents per banknote, irrespective of banknote substrate. (Our counterfactual paper banknote cost assumption is conservative. A more realistic approach might be to add 5 cents to the previous paper banknote cost rather than boost it by 20 per cent, since additional security features are likely to be similarly expensive for paper and polymer banknotes. Doing this would increase estimated savings by around 30 per cent.)

The longer life of polymer banknotes is what drives their reduced ongoing cost, due to lower transport, destruction, processing, and production costs over time. The average lifespan of Australia's polymer banknotes has increased since issuance, however, which at least in part is likely due to structural

changes largely unrelated to the substrate (e.g. greater hoarding and less transactional use of banknotes, improved banknote distribution systems, and banknote processing machine upgrades). It seems reasonable to assume that some of this increase in banknote life would have occurred with paper banknotes also. To account for this, we grow the counterfactual paper banknote life by the average increase in polymer banknote life. It is important to note that different assumptions around the average life of the counterfactual paper banknote series will lead to different estimated cost savings, with longer assumed paper banknote life leading to fewer savings, and shorter assumed paper banknote life leading to more savings.

### Results

Using a simple data-driven estimate of average banknote life through time, the cost-benefit analysis framework outlined above suggests that the introduction of polymer banknotes has led to large savings for the Bank and ultimately the Australian public. Most of these savings relate to the low denominations which tend to be used more for transactions than for store-of-value purposes (\$5, \$10 and \$20; Graph 2). For these banknotes, upgrade costs are estimated at between \$30 and \$50 million, and the break-even point was achieved within four years of issuance. The relatively quick break-even time was driven by the very low banknote life of low denomination paper banknotes, being less than a year prior to polymer. For the \$50 banknote, a greater outstanding volume means that estimated upgrade costs are higher at around \$60 million, and the break-even point occurred after about eight years. For the \$100 banknote, upgrade costs are estimated at around \$30 million. Net savings remain negative for the \$100, reflecting relatively long assumed paper banknote life due to more store-of-value and less transactional use. From the issuance of the first polymer series of banknotes until the recent introduction of new-series NGB banknotes, we estimate that the Bank will have saved just under \$1 billion in inflation-adjusted terms.

It is worth highlighting again that these estimates are sensitive to our assumptions, including those regarding banknote life (with the longer average life of polymer banknotes the driver of cost savings). If we instead use model-driven estimates of average polymer banknote life as contained in Aves (2019), estimated savings over the past 25 years are around 25 per cent higher. Conversely, if we base the assumed banknote life of the counterfactual paper series on public data on the UK’s paper banknotes available from the Bank of England (instead of assuming that paper banknote life grows in line with polymer banknote life), estimated savings are still positive but are around 25 per cent lower.

### Additional considerations

Although the model above is illustrative, it does exclude some important costs and benefits. The primary motivation for introducing polymer banknotes was to make counterfeiting more difficult by significantly increasing the security of Australia’s currency. Counterfeiting rates did decline after the issuance of polymer and stayed low for many years. Quantifying these benefits and including them in the model would increase annual savings and reduce the time taken to reach the break-even point. However, due to the difficulty of putting a dollar value on this benefit, which includes the direct loss of inadvertently accepting a counterfeit as well as the potential for a loss of confidence in the currency more generally, we do not consider it here. Further, the longer banknote life of polymer partly contributed to the Bank

changing storage and processing arrangements to a largely outsourced model (Menzies 2004). This resulted in a number of Reserve Bank branches closing and the Bank making considerable savings (see Box B for a discussion of the evolution of the Bank’s banknote distribution arrangements). It is likely that some of these arrangements would eventually have occurred had the Bank continued with paper banknotes, and so we again exclude them.

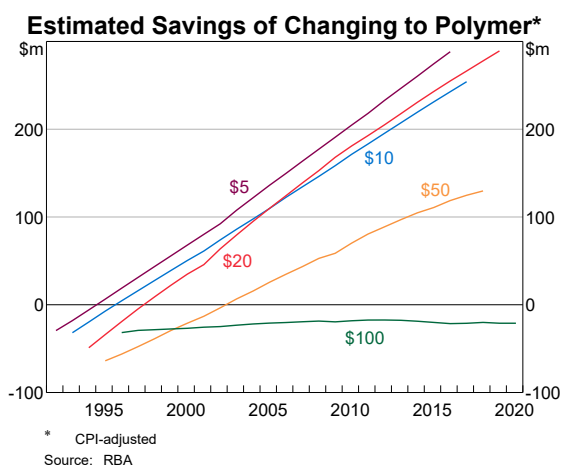
Working the other way, the Bank spent about \$30 million on polymer research and development (R&D) over the period 1968–88 and approximately \$2 million in public education when polymer banknotes were first introduced. Adjusting for inflation brings these costs to approximately \$150 million in current prices. Moreover, the Bank has to periodically cleanse and upgrade banknotes regardless of the substrate used (for example, the Bank is currently upgrading from the first series of polymer banknotes to new-series NGB banknotes), and these costs will be higher when the substrate is polymer.

In the section below we attempt to incorporate an upgrade cycle into our model. We assume that each time a series of banknotes is upgraded, per-banknote printing costs rise by 20 per cent irrespective of substrate. Moreover, we assume set-up and R&D costs would have been equivalent under either a paper or polymer upgrade. Using the cost-benefit analysis framework and the above assumptions, we estimate that NGB upgrade costs are about \$160 million higher than they would have been had the Bank continued using paper banknotes, although the figure of course depends on numerous assumptions, including the number and level of security features incorporated into the hypothetical paper banknote (Graph 3).<sup>[3]</sup>

### A general setting

The length of time between the first and second generation polymer banknote series in Australia – about 25 years – was significantly longer than most central banks would expect to have between series, which is typically in the order of 10 to 15 years, which highlights how successful the move to polymer was in terms of security.

**Graph 2**



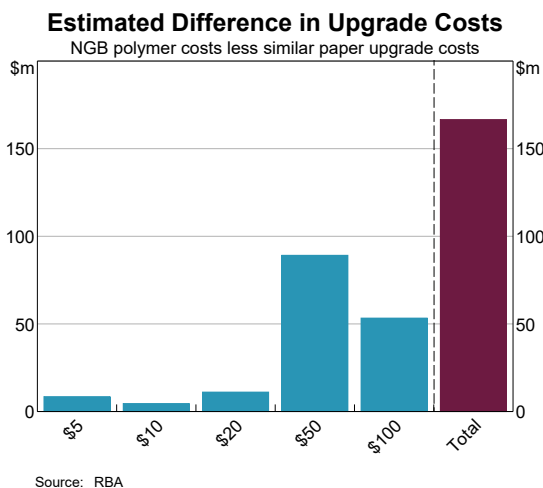
We now illustrate the trade-offs between paper and polymer in a hypothetical setting where upgrades occur every 15 years. At time zero we take the cost to produce polymer and paper banknotes to be those quoted earlier. We start circulation and banknote life where they were at the initial switch to polymer, and assume that the Bank undertakes a banknote upgrade immediately. We then apply average annual circulation growth rates. The next time the Bank has to upgrade a banknote series, we assume that the unit production cost for both paper and polymer banknotes increases by 20 per cent. Further, we let banknote life trend higher in line with past experience. Finally, for simplicity we assume that the Bank upgrades all denominations at the same time.

The longer lifespan of polymer banknotes again leads to the accumulation of significant savings over time (Graph 4; top panel). With the introduction of each new series, however, the Bank incurs higher upgrade costs than it would have if the upgrade was made with paper, causing drops in net savings. At a denominational level, we again see that gains from issuing polymer \$5, \$10 and \$20 banknotes account for most of the savings (Graph 4; bottom panel). Savings from the \$50 banknote are also substantial, while they are negative for \$100 banknotes, due to large upgrade costs and the assumption that paper banknote life would have increased over time (after 30 years, our counterfactual \$100 paper banknote life increases to 60 years, compared with an upgrade cycle of

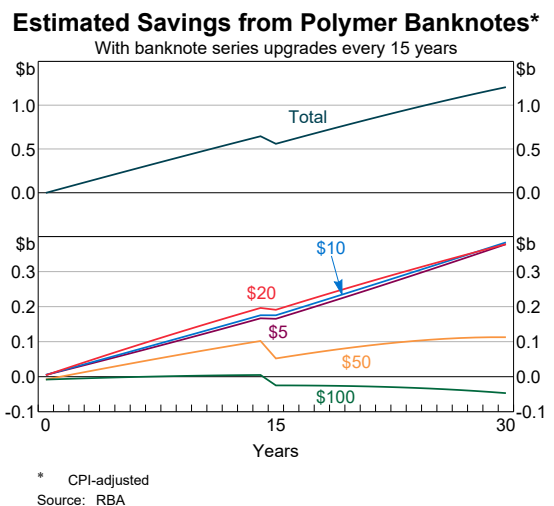
only 15 years). This highlights that with more frequent upgrades, ever-longer banknote life is not particularly useful since the counterfeit-resistance of security features becomes the binding constraint, and many banknotes will be recalled before they are physically worn out.

In summary, Australia’s move to using polymer banknotes around 25 years ago has been very successful: the banknotes have proved difficult to counterfeit, which was the original aim; and they have been very durable, which has saved the Bank and, by implication, Australian taxpayers, roughly \$1 billion over that period. These cost savings have been driven by those banknotes which are predominantly used for transactions – the \$5, \$10, \$20 and to a lesser extent the \$50. Conversely, the \$100 banknote is to a large extent used as a store of value. This means that it does not tend to wear out, and so the extra durability of polymer over paper is less of an advantage from a cost perspective (although the added security of polymer, while not considered here, has been very beneficial). ❖

**Graph 3**



**Graph 4**



## Box A: Seigniorage<sup>[4]</sup>

### What is seigniorage?

Seigniorage is the financial benefit (or loss) that a government or central bank receives from issuing currency. (The term 'seigniorage' comes from earlier times when only the seignior, or lord, had the right to mint coins.) Historically, seigniorage was the difference between the face value of currency issued and the cost to produce it. That is, it was the profit (or loss) realised at the time currency entered circulation. Seigniorage from coins issued by the Royal Australian Mint is still calculated in this way. Most banknote issuing authorities, however – including the Bank – do not book a profit when banknotes are issued. Rather, since commercial banks can and do return banknotes to the central bank, the Bank treats banknotes as zero-interest liabilities. Seigniorage is then the benefit (or cost) that flows from being able to issue such liabilities and invest the proceeds in interest-bearing assets.

In particular, for banknotes to first enter circulation, commercial banks must purchase them from the Bank. To do this, they pay the Bank using their Exchange Settlement Accounts (ESAs) a sum equal to the face value of the banknotes purchased.<sup>[5]</sup> This entails a fall in ESA liquidity which, if not offset, might eventually cause the overnight cash rate to deviate from its policy target. To avoid this, the Bank typically purchases some interest-bearing asset from the private sector (either outright, under repurchase agreement, or via a foreign exchange swap), the effect of which is to return liquidity to the ESAs. When commercial banks return banknotes to the Bank, the reverse occurs. Consequently, the Bank collects seigniorage over the period for which banknotes stay in circulation.

### Measuring seigniorage

As with other forms of profit, seigniorage can be calculated as the revenue obtained from issuing currency, less the costs involved.

### Revenue

The most common method for measuring seigniorage revenue is as the flow of income from investments purchased with funds acquired through currency issuance.<sup>[6]</sup> As central banks (including the Reserve Bank) typically do not disaggregate asset returns by their funding source, one typically prorates total interest income by the share of liabilities accounted for by banknotes in circulation.

A drawback with this approach, however, is that it frames the gain from issuing banknotes in terms of the central bank's investment performance, when the benefit really flows from being able to issue a zero-interest liability. To illustrate this, imagine that there are two neighbouring countries that are identical except that the central bank of country A is able to achieve high investment returns whereas the central bank of country B is not (with the difference perhaps due to the respective investment mandates, investment skill, or natural variability in returns). When country A invests the funds obtained from currency issue, it makes a large return and records high seigniorage. Country B on the other hand makes a negative return on the funds obtained from issuing banknotes, resulting in a loss from seigniorage. The issue is that two separate matters are being conflated: the benefit of not having to pay interest on one's liabilities, and the return one manages to make using the funds thus obtained.



An arguably better measure of seigniorage revenue is the spread between zero-interest banknote liabilities and the cost of alternative financing. Appropriate benchmarks might include the policy interest rate set by the central bank or the yield on a longer-term government bond.

### Production costs

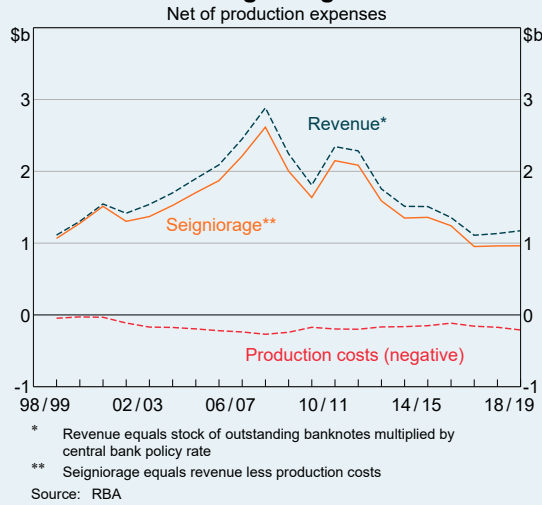
We take production costs as all expenses incurred by the Reserve Bank in relation to banknote production, distribution and policy, since the Bank would not incur these costs if it did not issue banknotes. A few of the more significant cost components are worth highlighting:

- For banknotes to be issued, they have to first be manufactured. Australia's banknotes are made by Note Printing Australia (NPA), a wholly owned subsidiary of the Bank. In 2018/19, the Bank paid NPA \$108 million for the supply of new banknotes and related services (RBA 2019).
- To discourage excessive movement of banknotes, and encourage commercial banks to maintain sufficient banknote stocks to meet unexpected changes in demand, the Bank pays interest compensation on banknotes held in approved cash centres. In 2018/19 this amounted to \$54 million (RBA 2019).
- To encourage effective banknote fitness sorting, the Bank operates various incentive schemes, including the Note Quality Reward Scheme, which pays (or charges) commercial banks a sum related to how well fitness sorting is conducted. In 2018/19 the Bank made roughly \$15 million in incentive payments.

### Seigniorage in Australia and around the world

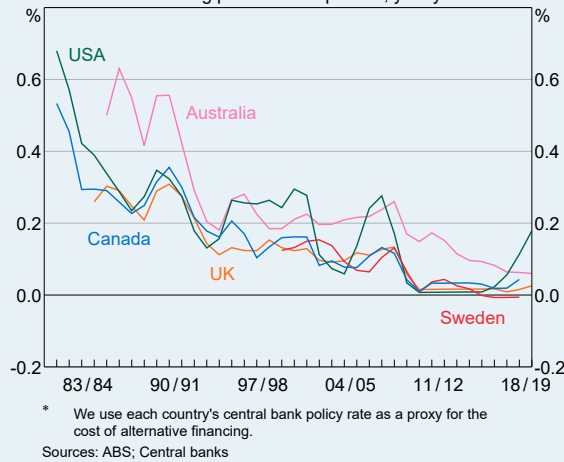
Using the Reserve Bank's policy rate as the alternative cost of financing, we estimate annual seigniorage to have ranged between \$1 billion and \$3 billion over the past two decades (Graph A1); this corresponds to between 0.05 and 0.25 per cent of nominal GDP. Taking a shorter view, annual seigniorage – both in value and as a share of GDP – has declined sharply since 2008. This reflects falling interest rates over this period, somewhat offset by a rise in outstanding banknotes, with the value of banknotes in circulation as a share of nominal GDP increasing from 3½ per cent in 2014 to around 4 per cent at the end of 2018.

**Graph A1**  
**Seigniorage**



Australia’s estimated seigniorage revenue as a share of nominal GDP has followed a similar trend to that of other comparable countries, although it has generally been a little higher (Graph A2). Both facts largely reflect interest rates, which tend to broadly move together across advanced economies, with Australia’s prevailing level of interest rates typically a little higher than interest rates in the other countries shown.

**Graph A2**  
**Seigniorage as a Share of GDP\***  
Excluding production expenses, yearly



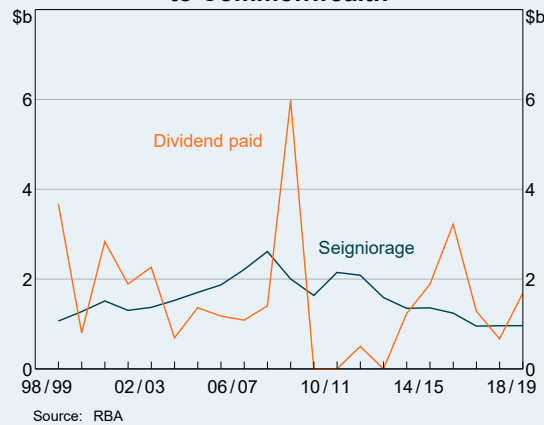
Note that our calculation of seigniorage may differ from that published by other central banks, for two reasons. First, we use our preferred revenue measure discussed above, while other central banks might not. Second, we do not deduct production costs in the international comparison due to a lack of comparable data. This is particularly evident for Sweden: our measure of Swedish seigniorage is negative, since policy

rates in Sweden are negative, whereas the Riksbank records seigniorage as contributing positively, reflecting positive investment returns.

### Distributing the Profits of Seigniorage

Unlike some other central banks, the Reserve Bank does not list seigniorage as a line of revenue on its financial statements. Indeed, there is no formal place for seigniorage in the accounting standards that the Bank must adhere to. Instead, the Bank records net interest income from all activities while highlighting that a large portion of this flows from its ability to issue non-interest-bearing liabilities. Net interest income then forms part of the Bank’s net profit, with the Bank paying a part of its profits to the Australian Government as determined by the *Reserve Bank Act 1959* and the Treasurer. In 2018/19, the Bank recorded a net profit of \$4.5 billion. Our estimates suggest that seigniorage accounted for about 20 per cent of this. In 2018/19, the dividend payable to the Commonwealth was \$1.7 billion (Graph A3).

**Graph A3**  
**Seigniorage and RBA Dividend to Commonwealth**



## Box B: Savings from Outsourcing Cash Processing

### History

Prior to the introduction of polymer banknotes, the Reserve Bank ran cash-related branch operations around Australia, and was involved in banknote distribution to commercial banks. The introduction of polymer banknotes, however – which were longer-lasting, more secure, and required less processing – led to a series of decisions from the mid 1990s onwards to close branch-related services and outsource the majority of cash distribution to the private sector. This also coincided with broader Australian Government competitive neutrality reforms, which aimed to ensure that publicly owned businesses did not enjoy a competitive advantage over the private sector simply because they were publicly owned.

In particular, the Reserve Bank ceased its previous practice of providing cash directly to commercial bank branches over the late 1990s. Instead, the Reserve Bank introduced ‘note pools’ – banknotes owned by the Reserve Bank but located at commercial cash depots operated by cash-in-transit (CIT) companies – with CITs using these pools to service commercial bank branches. This change removed the need for the Reserve Bank to operate regional branches throughout the country, and these were closed.<sup>[7]</sup>

In the early 2000s, commercial banks assumed ownership of the note pools. The new arrangement encouraged commercial banks to trade banknotes between each other, rather than dealing with the Reserve Bank directly. This increased efficiency by reducing excessive transportation and processing of banknotes. To compensate commercial banks for interest forgone on their new holdings of physical currency, the Reserve Bank agreed to pay commercial banks interest on banknotes held in approved cash centres, provided the cash centres fitness-sorted the banknotes and were regularly audited. The interest compensation is in line with the interest that would have been earned were the commercial banks to instead hold electronic balances at the Reserve Bank in their Exchange Settlement Accounts.<sup>[8]</sup>

### Benefits and savings

Outsourcing cash distribution has improved efficiency within the cash distribution system by reducing double-handling, and increasing the incentives to recycle cash locally rather than transport it back and forth between individual commercial bank branches and the Reserve Bank. While the Bank began paying interest compensation to commercial banks on part of their banknote holdings, the cost of this was offset by increased seigniorage earned on those banknotes; other resource costs related to staffing, banknote sorting equipment, buildings, and the transportation of banknotes fell. For example, in 1996/97 just before outsourcing began, banknote distribution cost the Bank around \$60 million in inflation-adjusted terms, whereas in 2018/19 this had fallen to around \$25 million excluding interest compensation (RBA 1997b, RBA 2019).

## Footnotes

- [\*] The authors are from Note Issue Department and would like to thank Katie Healey and James Holloway for their input.
- [1] See Ball 2019 for a discussion of banknote security features and recent trends in counterfeiting.
- [2] Allowing multiple series to co-circulate can, however, cause confusion and make the passing of counterfeits easier; see Finlay and Francis (2019).
- [3] This calculation assumes that the Bank upgraded all banknote denominations at the same time, which is not quite true. For reference, for each extra cent of production cost difference between the hypothetical paper and polymer banknotes, upgrade costs change by around 10 per cent relative to those shown in Graph 3, and total savings over an assumed 15-year lifecycle change by around 10 per cent relative to those shown in Graph 4.
- [4] Note that the Reserve Bank accounts for income as per the relevant accounting standards, which do not include a formal definition of seigniorage, and this note is intended as a discussion of economic concepts rather than accounting principles.
- [5] See <https://www.rba.gov.au/payments-and-infrastructure/esa/> for more detail on Exchange Settlement Accounts, and <https://www.rba.gov.au/education/resources/explainers/pdf/how-the-reserve-bank-implements-monetary-policy.pdf> for a simple explanation of how the Bank trades to keep the cash rate at target.
- [6] See for example RBA (1997a), as well as the Bank of England and Sveriges Riksbank annual reports.
- [7] Other factors, including a decline in the Reserve Banks' provision of banking services to government, also contributed to the closure of regional branches; see RBA (2000) for more information.
- [8] If the Reserve Bank did not pay interest compensation on banknote holdings, commercial banks would have a strong incentive to minimise their banknote holdings, which they would do by moving banknotes to and from the Reserve Bank more frequently. This would increase transport and environmental costs. Reduced banknote holdings by the commercial banks would also reduce seigniorage income to the Reserve Bank.

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# Long-term Growth in China

Ivan Roberts and Brendan Russell<sup>[\*]</sup>



Photo: Photographer is my life – Getty Images

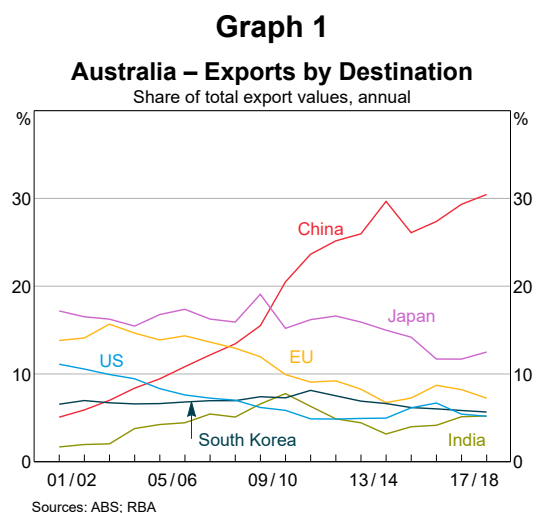
## Abstract

Slowing trend growth in China, and the risks around this trajectory, are relevant to the future economic prospects of its major trading partners, including Australia. This article provides a long-term perspective on growth in China, beginning with a review of historical trends. It then examines the drivers of growth since reforms were introduced in the late 1970s and how these drivers are affecting the growth outlook. The article concludes that a range of structural headwinds will constrain growth in the coming decade, posing challenges for policymakers.

## Introduction

China is Australia's largest trading partner, and it is likely to remain so for the foreseeable future. In both values and volumes, trade with China has eclipsed Australia's other major trading partners since the late 2000s (Graph 1). The trade relationship with China has also broadened over time. While bilateral trade continues to be dominated by Australian exports of resources, such as iron ore, coal and liquefied natural gas, exports of services (especially tourism and education) and rural goods have also grown rapidly in recent years (Graph 2). Rapid growth in services exports has been reflected in large numbers of visitor arrivals from China, which have driven the overall upward trend in arrivals to Australia over the past decade.

The growth in Australia's exports to China has been closely connected to domestic conditions in China.



Rapid expansion of the Chinese economy in the 2000s, and a highly investment-intensive pattern of growth, spurred demand for heavy industrial products, such as steel. In turn, this has driven a sharp increase in Chinese imports of steelmaking raw materials: iron ore and coking coal. More recently, rising household incomes in China have underpinned a preference shift towards high-quality imported agricultural and health products (including infant formula and vitamin supplements) and increased demand for overseas travel and tertiary education services.

The expansion of Chinese demand in the mid 2000s outstripped the global supply of resource commodities, which boosted Australia’s terms of trade and thereby supported Australian national income and government revenues (for example, through collections of resource rent taxes). It also led to significant compositional changes in Australia’s labour market as workers were absorbed by the rapidly growing mining sector and associated services industries, including accounting, legal and engineering services.

The depth of these linkages means that the potential for growth in China to slow further, either gradually or sharply, represents a significant risk for the Australian economy. This article analyses China’s growth performance in its longer-term context and examines how underlying structural drivers of growth have shifted in recent years. It then considers the growth outlook. Finally, the article discusses the uncertainties around this trajectory,

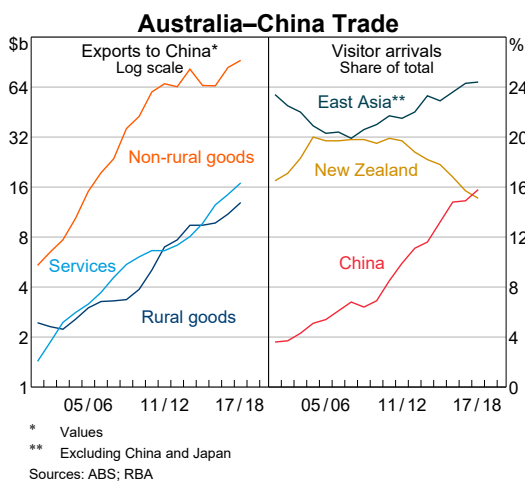
focusing on financial risks and the escalating US–China trade and technology disputes.

### Long-term Economic Trends

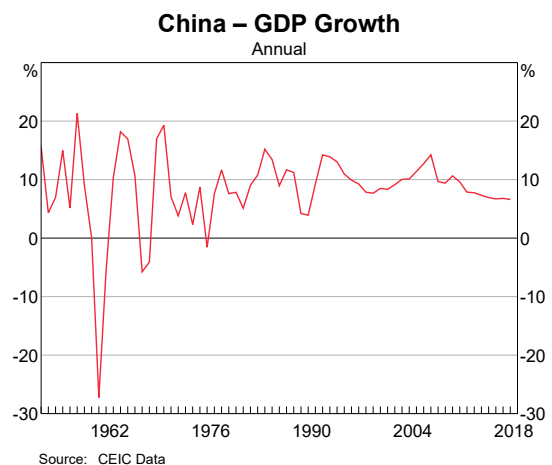
The People’s Republic of China (PRC) has experienced pronounced swings in growth since its founding in 1949 (Graph 3). While data from official sources and alternative calculations made by academics (for example, Wu (2014)) have periodically diverged substantially, over the long term, different estimates of Chinese GDP growth display broadly similar trends. In general, growth was highly volatile during the period during which China was led by Chairman Mao Zedong (1949–76) but significantly less so during the era of economic reforms that started in the late 1970s.

The volatile growth pattern in the 1950s and 1960s was largely a consequence of the economic system that emerged during these years, but was also compounded by external factors. The devastation inflicted by the war with Japan (1937–45) and the Chinese Civil War (1927–49) necessitated the rebuilding of a large amount of infrastructure, housing and manufacturing capacity. The new government was also keen to develop heavy industry, so economic growth was initially strong. In these early years, despite radical redistribution of land to poorer farmers in rural areas, the Chinese Communist Party (CCP) initially tolerated private ownership, allowing private business and farming practices to continue in many areas (Naughton 2007, p 65).

**Graph 2**



**Graph 3**



However, by the late 1950s, the introduction of central planning on a large scale began to affect economic outcomes. In rural areas, the authorities attempted to achieve economies of scale by amalgamating traditional small plots of land into cooperatives or collectives (and eventually even larger communes) worked by large numbers of families, who shared in the gains from production (Perkins 1964).<sup>[1]</sup> In urban areas, adults were assigned to 'work units' or *danwei* (such as factories) and, in compensation for their labour, received ration vouchers for grain and other essentials (Chinn 1980), as well as guaranteed housing, medical care and education for their children. Population mobility was discouraged; households were assigned urban or rural registration permits (*hukou*) that largely confined them to the area in which their members worked. Annual production targets and a schedule of prices for key commodities were set centrally and the state effectively assumed responsibility for allocating resources throughout society.<sup>[2]</sup>

The system encountered severe challenges. A huge burden fell on government officials to make correct decisions regarding resource allocation, which then had to be implemented by Party members at the local level. Calibrating centrally determined policy guidance to local conditions was difficult given the size and geographical diversity of China, and local officials often lacked relevant management, agriculture or industry experience (Perkins 1964). In addition, the system distorted incentives: productive workers received the same reward as unproductive workers, which reduced their motivation to work.

The periods of greatest weakness tended to coincide with radical changes in economic policies and in the political environment. Efforts to impose overly ambitious production targets during the Great Leap Forward (1958–60), exacerbated by a series of natural disasters, led to sharply weaker growth, and contributed to the country experiencing a catastrophic famine in 1962, estimated to have caused the loss of 25–30 million lives (Naughton 2007, p 72). The economy also entered recession during the immense social

upheaval of the Great Proletarian Cultural Revolution (officially dated from 1966 to 1976).

The consequences of central planning prompted the leadership to change course at the 3rd Plenum of the CCP's 11th National Congress in December 1978. Led by Party elder Deng Xiaoping, the CCP embarked on efforts to build a hybrid economy that allowed markets to play a greater role, albeit constrained by tight administrative controls. The first stage of reforms was to reverse the policy of collectivisation in the countryside, and reintroduce markets (and market prices) for agricultural goods. This proved crucial in increasing agricultural productivity, especially in grain production (Garnaut and Ma 1996). Subsequent reforms endeavoured to incentivise managers in the corporate sector to make state-owned enterprises (SOEs) more efficient and profitable. Throughout the 1980s and 1990s, the government loosened barriers to trade and foreign investment, which helped develop the country's manufacturing export sector and gave Chinese firms the opportunity to learn foreign technologies.

These reforms, in turn, created the need for a modern financial system. Prior to the reforms, there was little need for banks to intermediate between lenders and borrowers, since investment was mainly financed by budgetary grants and the retained profits of enterprises, and household savings were small (Lardy 1998, pp 59–61). However, the growing investment needs of urban and rural enterprises, rising household incomes, and the gradual replacement of the strict coupon-based rationing system with a cash economy, created the need for a commercial banking system. Through the 1980s and 1990s, a large number of banks and smaller non-bank financial institutions came into operation.

An important aspect of the reforms was the relaxation of controls on the prices of many goods and services that had been relatively stable under central planning (Graph 4). Yet the dangers of rapid price reform soon became apparent; during 1988–89, a period of strong growth, inflation surged to nearly 20 per cent, exacerbating political and social tensions. The government responded by implementing strict austerity measures to lower inflation, including cutting public spending,

instructing banks to stop lending and reimposing price controls. While this brought inflation temporarily under control, the consequence was a sharp slowdown in parts of the economy in the late 1980s (Brandt and Zhu 2000).

In a bid to reinvigorate the reform agenda, Deng Xiaoping visited several locations in southern China in 1992, giving his personal endorsement to the reform strategies being pursued there. This was followed up at the CCP's 14th National Congress in 1992 by pledges to build a 'socialist market economy', and more detailed plans that were issued in 1993 (Wu 2019). These efforts contributed to a quick recovery in growth, but also inflation. High inflation was subsequently brought under control through tighter monetary and financial policies, and measures to increase food production and imports, which alleviated upward pressure on food prices (Oppers 1997).

The most important milestone in the 1990s was the reform of SOEs. Under the 'work unit' system, SOEs were responsible for the employment, social welfare and housing of a sizeable population; but since many were unprofitable, a large part of this welfare burden was ultimately shifted to the state. By encouraging forced layoffs of unproductive workers, and allowing smaller SOEs to be privatised, the government was able to markedly improve the efficiency of the corporate sector. Firms were forced to become profitable to survive, reducing the burden on state finances from unprofitable enterprises. The reforms also withdrew the

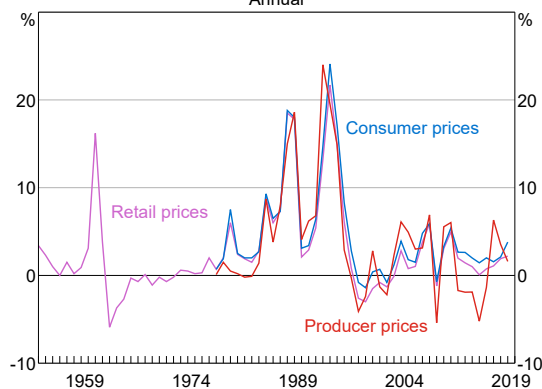
obligation of SOEs to provide housing for workers. Instead, starting in 1998, households were permitted to purchase and sell housing that had been allocated to them, leading to the emergence of a flourishing private housing market.

The reforms to SOEs heralded the end of the state-guaranteed system of social security, while also boosting the efficiency of the corporate sector. The associated housing reforms also had a lasting influence. On the one hand, during a period when real interest rates were frequently negative due to high rates of inflation, they gave people a place other than the often-volatile stock market (established only in 1990) to invest their savings. On the other hand, the creation of a housing market encouraged a huge boom in property development and investment that supported growth more broadly.

While the late 1990s were a turbulent period for the economy for other reasons (not least of which were the Asian Financial Crisis in 1997 and a non-performing loan crisis in the banking sector), in the aftermath of these problems the Chinese economy received a major boost from its accession to the World Trade Organisation (WTO) in 2001. WTO entry required China to remove more restrictions on exports, imports and foreign investment, which enhanced China's access to overseas markets and increased the flow of trade and foreign investment through the 2000s.

The global financial crisis (GFC) in 2008–09 magnified a slowing in growth that was already becoming apparent as the positive effects of earlier reforms started to wane. The GFC led to a sharp fall in advanced economies' demand for Chinese exports, which weighed heavily on domestic manufacturing. The Chinese Government's fiscal and monetary stimulus response to the crisis temporarily lifted GDP growth, largely by supporting investment in housing and infrastructure. More importantly, however, it forestalled the even sharper downturn in growth that would have eventuated in the absence of such a vigorous response.

**Graph 4**  
**China – Inflation\***  
Annual



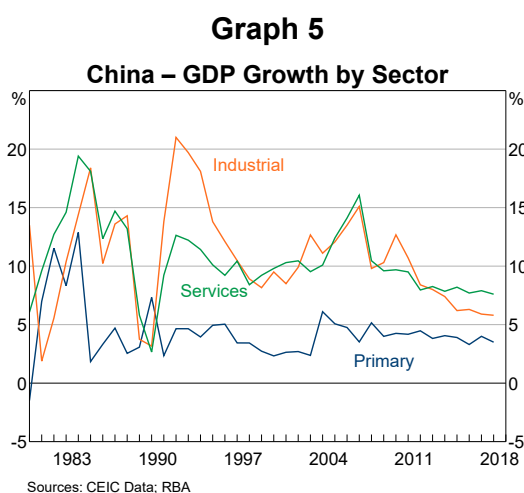
\* Figures for 2019 are estimated based on data up to October  
Sources: CEIC Data; RBA



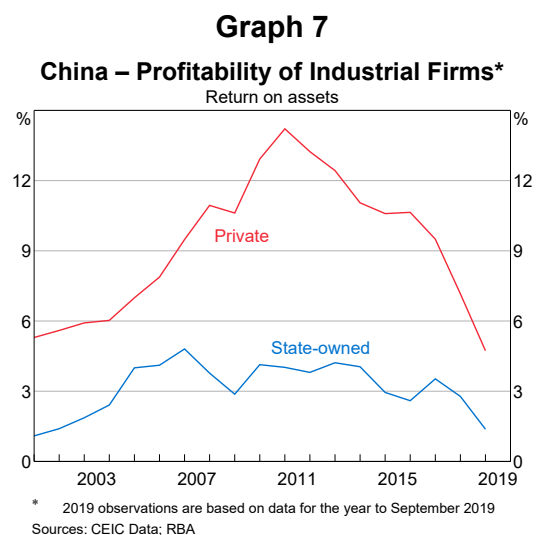
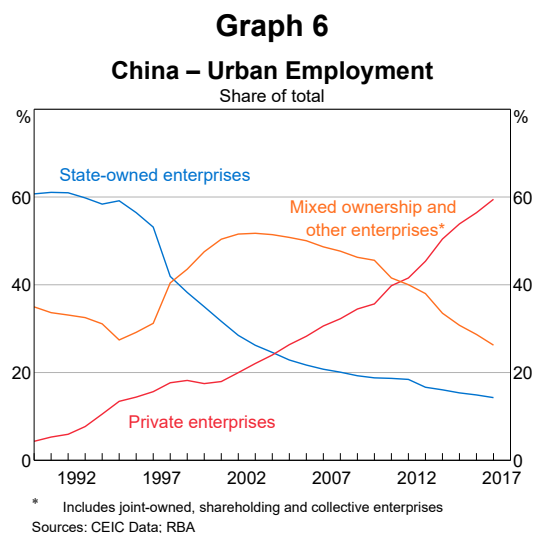
## Growth in the Reform Era

Economic growth in the period since 1978 has largely been driven by structural forces – in particular, industrialisation, privatisation, urbanisation and demographic change. The reform era saw China industrialise on a huge scale (Graph 5). Growth in the industrial sector was especially strong in the 1990s and has remained a significant contributor to GDP growth until quite recently. The growth of the industrial sector was related in part to China's growing role in the global economy; over this period, Chinese exports increased from less than 1 per cent of global exports to more than 12 per cent. Since 2011, however, the pattern of domestic growth has shifted, being increasingly reliant on services rather than industrial production.

A second outcome of the reform era was the erosion of central planning and a flourishing of private enterprise. In 1997, the government endorsed the privatisation of the majority of SOEs nationwide, mainly through sales to existing managers and other firms, while retaining state ownership of large firms in strategic industries (Gan 2009). The SOE reforms underpinned a sharp compositional shift in urban employment (Graph 6). SOEs' share of urban employment declined from almost two-thirds in 1990 to 15 per cent by 2017, while private employment soared. The changing ownership of firms also contributed to the productivity and profitability of the business sector, as private industrial firms were typically much more efficient and profitable than state firms (Graph 7).



A third trend, reinforced by economic reforms, was urbanisation. Rapid economic growth and a strong demand for labour in urban areas, especially in the burgeoning private sector, encouraged people to move from rural areas in pursuit of more lucrative job opportunities in the cities (Graph 8). This was facilitated by the abolition of the commune system and the relaxation of geographic restrictions on farmers' employment (Cai 2018). Although people newly arrived to cities could get work, the *hukou* system continued to restrict their access to the healthcare, pension and education benefits enjoyed by urban residents. The sustained movement of people from often unproductive jobs in agriculture to productive jobs in cities helped to boost aggregate productivity growth (Zhu 2012). It also helped fuel the boom in housing construction and



the growth of transport infrastructure to facilitate the movement of millions of people each year into urban areas.

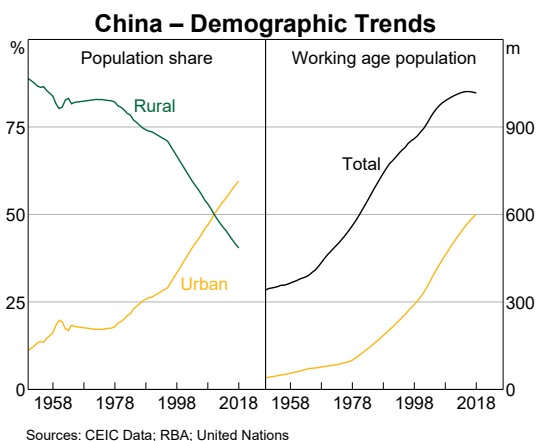
A fourth trend that complemented the economic reforms was the rise in the working-age population. After a baby boom at the end of the Mao era, the working-age population surged (Graph 8). Subsequently, the birth rate declined for a number of reasons, including constraints imposed by the government’s ‘one-child’ policy initiated in the early 1980s, and an emerging preference among households for smaller families as living standards and education levels improved (Cai 2018). Rapid growth in the working-age population created a large supply of workers that contributed both to increased production and growth in aggregate demand. However, since 2011, the total working-age population has begun to fall. The urban workforce is still increasing as a result of urbanisation, but its growth rate has started to moderate as the birth rate has fallen and the population has aged.

The combination of rapid industrialisation, continuous urban expansion and a burgeoning private sector underpinned a highly investment-intensive pattern of growth. The rising working-age population also played a role, as the tendency of households to save during their prime working years led to the emergence of a large pool of savings that became available to fund investment. However, since the early 2010s, growth in investment has slowed and the contribution of investment to GDP growth has diminished

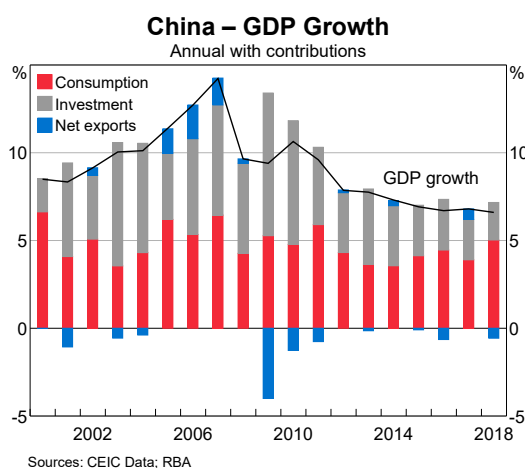
(Graph 9). While growth in consumption has also moderated as household income growth has slowed, it has remained strong relative to investment growth, resulting in a gradual ‘rebalancing’ of GDP growth away from investment and towards consumption.

The investment slowdown reflects a number of factors. Residential construction investment was one of the largest drivers of investment growth during the 2000s, contributing around half of total growth in investment. However, after a further boost from the government’s stimulus response to the GFC, the share of residential investment in GDP has stabilised at around 17 per cent (Graph 10).<sup>[3]</sup> While urbanisation is still continuing, there is evidence that the supply of housing has outpaced the basic needs of the urban population; according to the China Household Finance Survey (2017), the residential vacancy rate in China was estimated at around 21 per cent in 2017, which is significantly higher than the vacancy rate in other Asian economies, the United States and Australia. Saturation in urban housing markets, particularly megacities such as Beijing and Shanghai, implies that future growth in residential investment is likely to come more from replacement or upgrading of older housing than from growth in the urban population. Such replacement or upgrading activity could, nonetheless, be substantial given households’ changing aspirations for dwelling quality as their income rises.

**Graph 8**



**Graph 9**



More generally, the boom in investment in the late 2000s that followed the government's stimulus response to the GFC happened at a time when growth was already slowing for structural reasons. This led to a sharp increase in the capital-to-output ratio, which has in turn lowered the marginal return on new capital spending. As a result, the marginal product of capital – that is, the returns to new investment – has declined, which is likely to have reduced the incentive of the private sector to invest (Graph 11).<sup>[4]</sup>

The declining growth in the supply of labour and falling incentives to invest imply that, in the years ahead, the Chinese economy will increasingly have to rely on productivity improvements to sustain overall economic growth. Productivity growth, measured either in terms of labour productivity (i.e.

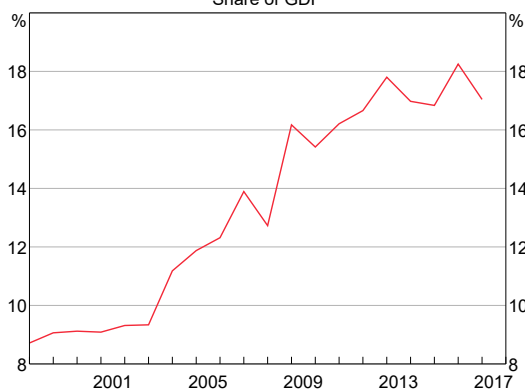
output per worker) or total factor productivity (which accounts for the contribution of capital as well as labour input to output growth), grew rapidly over much of the period following the start of reforms in the late 1970s (Graph 12).<sup>[5]</sup> This was an important factor driving the sustained increase in per capita incomes over this period. The investment-intensive nature of Chinese growth ensured that total factor productivity growth has typically been much lower than growth in labour productivity. Alternative estimates of GDP, capital and labour give rise to a large variation in estimates of productivity growth (Wu 2011). Nonetheless, most measures indicate a pronounced acceleration in productivity in the mid 1980s, the early 1990s, and the late 1990s–mid 2000s, followed by more subdued growth thereafter. Roughly speaking, these 'cycles' in productivity growth have tended to coincide with or follow major periods of economic reform. In the latest decade, productivity growth has slowed as the benefits of earlier reforms have faded.

### Recent Trends

Over the past few years, growth in China has continued to slow. Investment growth has weakened sharply, while consumption growth has moderated as growth in household income has slowed (Graph 13). Slower growth in domestic demand has weighed on imports. Growth in Chinese exports has also weakened as a result of the slowdown in advanced economies, a downturn in the global technology cycle and the escalation of

**Graph 10**

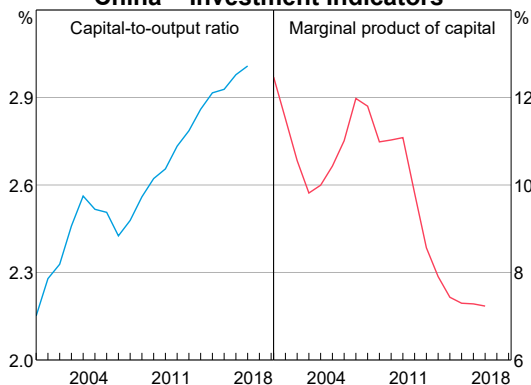
**China – Residential Investment\***  
Share of GDP



\* Estimated gross fixed capital formation  
Sources: CEIC Data; National Bureau of Statistics of China; RBA

**Graph 11**

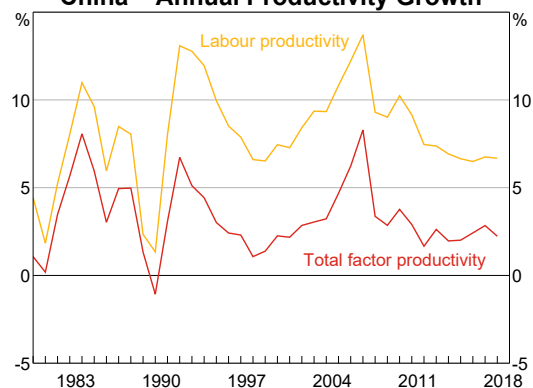
**China – Investment Indicators\***



\* Calculated using real GDP and estimated real capital stock (excludes residential construction) at 1978 prices; marginal product of capital is net of depreciation  
Sources: CEIC Data; National Bureau of Statistics of China; RBA

**Graph 12**

**China – Annual Productivity Growth**



Sources: CEIC Data; National Bureau of Statistics of China; RBA

the US–China technology and trade disputes in 2018–19.

Slower growth in financing to the business sector over recent years has reinforced the structural forces that were already putting downward pressure on growth. China’s total social financing (a measure of ‘broad credit’ that captures bank and non-bank financing to the real economy) has eased noticeably in the past two years, reflecting slowing growth in lending to businesses (Graph 14). While this may partly reflect weaker demand by the private sector, it also reflects the government’s regulatory crackdown on riskier forms of non-bank, off-balance sheet financing that began in 2017. This type of lending grew very strongly in the wake of the 2008–09 stimulus, but more recently it has been falling as a result of the government’s measures, which were designed to reduce vulnerabilities in the financial system.

In response to the downward pressure on growth over the past year or so, the government has eased monetary and fiscal policy, although to date the stimulus has remained relatively targeted. Authorities have stressed that they will not resort to a ‘flood-like’ stimulus akin to the countercyclical policies enacted during the GFC (PBC 2019a), and have pledged not to attempt to boost growth by stimulating residential construction (Ministry of Finance of the PRC 2019).

Instead, monetary policy easing by the People’s Bank of China (PBC) has primarily taken the form of cuts to required reserve ratios (which mandate the

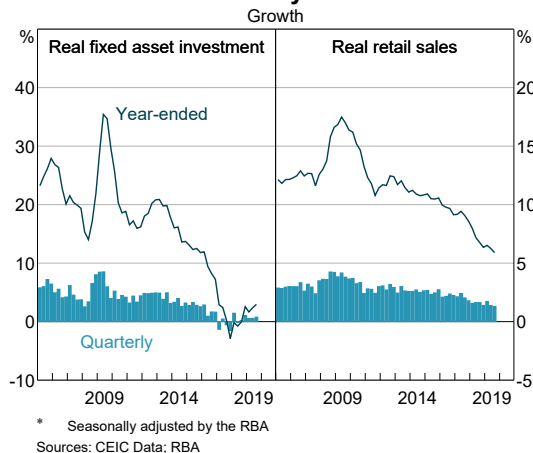
share of deposits that banks must hold with the PBC) to increase the supply of funds available for lending. The PBC has also guided money market interest rates lower, and issued guidance to banks to increase lending to small businesses and reduce interest rates for these firms. Complementing these measures, the government has eased fiscal policy through cuts to value-added, corporate income and household income taxes and by specifying higher local government bond issuance quotas to fund increased public infrastructure investment. Expansionary fiscal policy resulted in a sharp widening in the budget deficit through the second half of 2018 and in 2019, which probably helped to buoy investment and retail sales in the second half of 2019.

### The Outlook for Growth

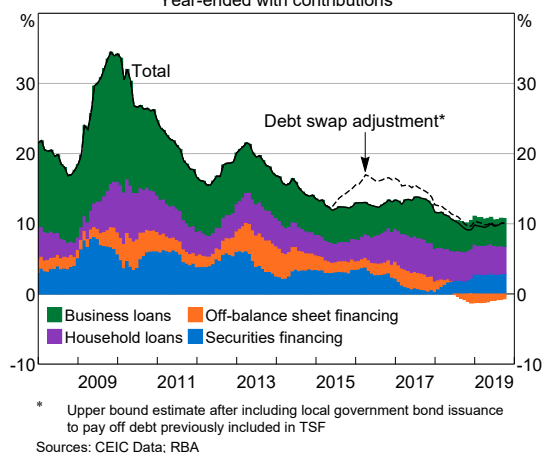
The long-term structural headwinds arising from a slowing working-age population, reduced incentives to invest and subdued productivity growth suggest that Chinese growth will slow further in coming years. As a thought experiment, presented in Graph 15, we consider a growth scenario that extrapolates trends (estimated over the past 10 years) in the production-side ingredients of GDP growth: labour, capital and total factor productivity.<sup>[6]</sup> The results indicate that, if recent trends were to continue, it is possible that GDP growth could halve from current rates by 2030.

International evidence reinforces the expectation that Chinese growth will continue to slow. For many

**Graph 13**  
China – Activity Indicators\*



**Graph 14**  
China – Total Social Financing Growth  
Year-ended with contributions



years, China has experienced faster growth than nearly all other major economies. However, as argued by Pritchett and Summers (2013), the other extraordinary growth experiences of the past, such as the rise of Japan after World War II, and the rise of east Asian economies starting in the 1960s, were typically followed by periods of sharply lower growth. They propose that the most robust empirical finding about growth globally is ‘regression to the mean’ – namely, the tendency for economies experiencing ‘above-normal’ growth to revert to the global average. Lee (2017) and Barro (2016) have also argued, on the basis of separate empirical analyses of international data, that Chinese growth is likely to slow further, as income per capita in China converges up towards the levels enjoyed in advanced economies.

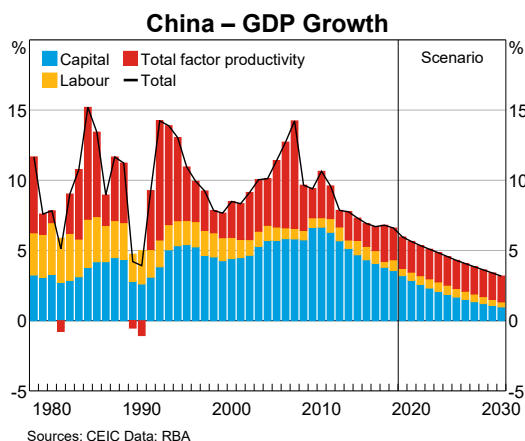
While the decline in the working-age population, and hence the available labour supply, can be expected to place downward pressure on growth in the years ahead, the extent of decline could be affected by changes in household preferences and government policy. For example, assuming a ‘high’ fertility scenario used in projections by the United Nations, in which the Chinese birth rate rises and stabilises above 2.1 births per woman (considered necessary for replacement), the working-age population would fall at a slower rate and eventually increase in the second half of the current century (Lim and Cowling 2016; Graph 16).<sup>[7]</sup> However, for fertility to increase, Chinese households would have to reverse their growing preference for smaller families, which would be a

dramatic shift given the transition from high to low fertility rates that has already happened.

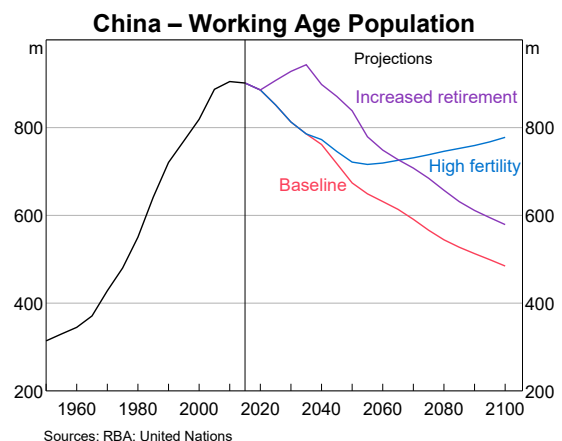
A more immediate increase in the working-age population could result from the government mandating increases in the retirement age. Assuming that the retirement age increases gradually from 60 to 65 between 2020 and 2035, the working-age population would initially increase, before resuming its downward trend. In other words, while increasing the retirement age would temporarily boost the available supply of labour, it would only delay, not prevent, the decline in the working-age population.

Growth in investment could also be stronger than recent trends would suggest if the government were to support investment through systematically more expansionary fiscal and monetary policy. However, the targeted approach to policy easing taken to date, and the government’s desire to avoid harming financial stability through excessive stimulus, suggest that, aside from attempting to smooth cyclical fluctuations, authorities are likely to accommodate a slowing trend growth trajectory. The staged lowering of GDP growth targets in recent years, and the leadership’s greater emphasis on the ‘quality’ of growth rather than its speed (Li 2018, 2019) reduce the probability that the government will attempt to engineer dramatically stronger growth in investment in coming years. However, the change in emphasis from high-speed to high-quality growth does indicate a renewed focus on improving productivity growth over the longer term.

**Graph 15**



**Graph 16**





The scenario presented in Graph 15 assumes continued low rates of productivity growth. It is difficult to forecast productivity because it depends on future technological progress and changes in government policy. There is also uncertainty about the starting point for productivity; some estimates suggests that Chinese productivity growth is weaker than official data suggest, and perhaps negative (Wu 2014; Feenstra, Inklaar and Timmer 2015). However, on any measure, there is still large scope for future productivity growth in China. For example, estimates that attempt to compare total factor productivity in individual countries to a ‘frontier’ economy (the United States) suggest that China remains significantly below the global productivity frontier, although data measurement issues mean that such comparisons are inevitably imprecise (Graph 17).<sup>[8]</sup>

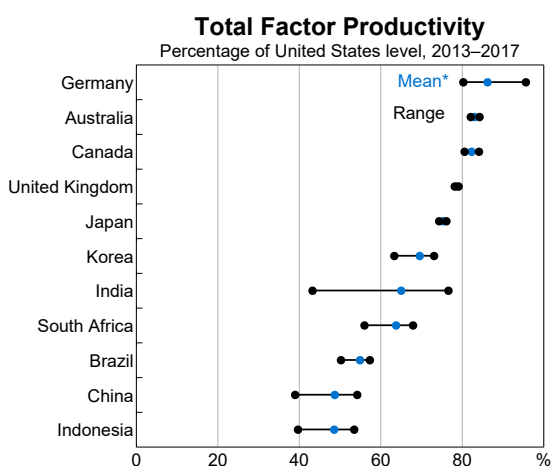
In recent years, the Chinese Government has implemented several initiatives to encourage faster productivity growth. These include allocating government funds to support innovation start-ups and boost spending on research and development (R&D), with a view to spurring technological innovation. Despite these efforts, growth in R&D spending has slowed from the rapid rates in the 2000s, and a high-frequency indicator of activity in high-value-added emerging industries (the Mastercard–Caixin–BBD New Economy Index) suggests that growth in innovative sectors has eased since 2017 (Graph 18). External pressures may also influence the pace of innovation in China in

coming years. Recent measures taken by the United States to restrict Chinese foreign investment in US technology and telecommunications industries and prevent sales of American technology to Chinese companies could, if they persist, impede or slow technological progress in some Chinese industries.<sup>[9]</sup> However, such measures are also likely to intensify efforts already underway in China to achieve self-sufficiency in key technologies.

Measures to boost technological innovation are only one aspect of the Chinese Government’s efforts to boost productivity growth. In addition, the government has implemented a series of ‘supply-side structural reform’ policies. These have succeeded in reducing excess capacity in parts of heavy industry, which has improved the profitability and efficiency of parts of the corporate sector. The government has also continued to undertake SOE reforms, which have focused on strengthening the role of SOEs in the economy rather than supporting the more profitable private sector (Naughton 2018; Lardy 2019). While boosting productivity is high on the government’s list of priorities, it remains to be seen whether the current mix of policies will be able to reverse recent trends.

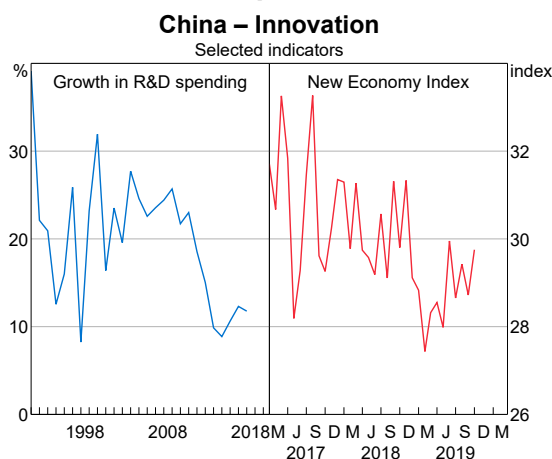
The prospect of growth continuing its slowing trajectory, largely for structural reasons, poses challenges for economic policy in China. The fact that nominal GDP growth was strong throughout the reform era allowed rising levels of debt to be matched by rising incomes. Combined with a cautious approach to the sequencing of financial

**Graph 17**



\* Average of three estimates  
Sources: Penn World Table 9.1 (Feenstra, Inklaar and Timmer (2015)); RBA

**Graph 18**



Sources: CEIC Data; RBA

reforms, and relatively low levels of foreign-currency denominated debt, this helped China avoid the chronic financial instability encountered by many other emerging economies in this transition phase. However, the investment-intensive (and largely debt-funded) pattern of growth since the GFC, combined with the structural slowing in growth, has seen the debt-to-GDP ratio rise sharply in the past decade, presenting risks to financial stability (Graph 19).

These risks relate not only to the high levels of debt, but also to broader financial vulnerabilities stemming from off-balance sheet lending and concerns about the quality of the debt issued. Declining nominal GDP growth means that growth in debt must also slow to prevent the debt ratio from rising further. Accordingly, current policy seeks to keep total social financing growth in line with nominal GDP growth (PBC 2019b). Since the early 2010s, there has been a rise in episodes of financial instability, including a disruption to the interbank market in 2013 and a collapse in stock prices in 2015. While these issues were themselves partly

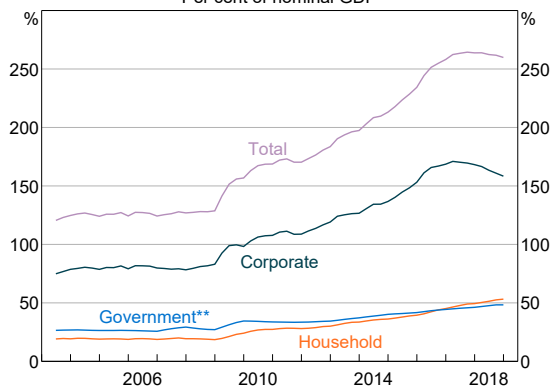
driven by earlier policy changes, they were prevented from causing more systemic problems by rapid policy responses once the risks were recognised. Regulatory reforms since 2017 have also been effective at slowing the corporate sector's accumulation of debt, thereby lowering the risk of a large-scale systemic financial disruption or crisis. Even so, the level remains high and household and government debt continue to rise. In this context, the government must strike a delicate balance between stimulating the economy enough to support overall GDP growth, and stimulating it too much via excessive growth in credit, leading to even higher levels of debt, and adding to financial vulnerabilities.

## Conclusion

China's emergence as one of the largest and fastest-growing economies in the world, beginning in the late 1970s, followed decades of economic volatility and social and political turmoil. The comparatively benign growth trajectory charted through the period of economic reforms was underpinned by rapid industrialisation, steady rural-urban migration, a rising working-age population, an increased role for the private sector, strong growth in residential investment and productivity-enhancing reforms. However, the reversal or slowing of many of these impulses suggests that China's period of 'above-normal' growth is drawing to a close. This will create challenges for policymakers, as they attempt to foster continued increases in incomes, while forestalling risks arising from high levels of debt. How the authorities navigate that trajectory will have significant implications for China's major trading partners, including Australia, in the years ahead. 🦋

**Graph 19**

**China – Non-financial Sector Debt\***  
Per cent of nominal GDP



\* Includes RBA estimates of shadow financing that are not included in total social financing

\*\* Includes some borrowing by local government financing vehicles

Sources: BIS; CEIC Data; RBA

## Footnotes

- [\*] The authors are in Economic Analysis department
- [1] Perkins (1964) estimates that cooperatives had an average size of 200 families, while communes comprised 4,000–5,000 families.
- [2] Targets were implemented for a much smaller number of commodities in the PRC than was the case in the Soviet Union (Naughton 2007, p 62). In practice, though, even

- the more detailed targets in the Soviet Union were rarely met and constantly revised (Gregory 2003). Thus, despite the differences between the Chinese and Soviet models of central planning, they encountered similar problems.
- [3] Residential investment in Graph 10 is estimated using a slightly modified version of the method in Koen *et al* (2013).

- [4] See Ma, Roberts and Kelly (2017) for further discussion of this issue. These estimates are based on official GDP and investment data. The capital stock is calculated using the perpetual inventory method, initialised at the 1952 level estimated by Wu (2014), and excludes residential investment.
- [5] These estimates are Törnqvist indices based on official GDP, investment (gross fixed capital formation, excluding residential investment) and employment data, and time-varying weights (labour and capital income shares). The labour share and capital shares are adjusted for taxes on production and are estimated using data from the official Flow of Funds (physical transaction) accounts, published by the National Bureau of Statistics of China. Labour input is adjusted for quality using data on average years of schooling derived from Barro and Lee (2001), Cohen and Soto (2007) and the UNDP (2018).
- [6] The calculation of trend GDP growth ( $y^T$ ) is:  

$$y^T = a^T + \alpha l^T + (1 - \alpha)k^T$$
 where  $a^T$  is trend growth in total factor productivity,  $\alpha$  is the labour share of income,  $l^T$  is trend growth in labour, adjusted for quality (average years of schooling) and  $k^T$  is trend growth in the capital stock. Linear trends are estimated by regressing each variable on a time trend. The calculation of trend growth in labour input assumes that employment grows at the same rate as United Nations projections of the working-age population and that average years of schooling follow their 10-year linear trend.
- [7] Graph 16 updates the scenarios from Lim and Cowling (2016) for recent data.
- [8] Cross-country comparisons of productivity yield divergent results depending on the approach and underlying assumptions. In light of the uncertainty around such estimates, Graph 17 averages calculations from three different methods and shows maximum and minimum estimates in each case. The measures correspond to input- and output-oriented data envelopment analysis models (Charnes, Cooper and Rhodes 1978) and independent estimates of total factor productivity across countries, at current purchasing power parity rates, compiled by Feenstra, Inklaar and Timmer (2015). The first two measures are estimated using output, capital stock and employment data from the Penn World Table 9.1 for G20 countries, using output estimates that impose transitivity in multilateral comparisons.
- [9] The policies are documented by US Department of the Treasury (2018) and Federal Register (2018).

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# Potential Growth in Advanced Economies

Ivailo Arsov and Benjamin Watson<sup>[\*]</sup>



Photo: yongyuan – Getty Images

## Abstract

Potential growth is the rate of growth that an economy can sustain over the medium term without generating excess inflation. Potential growth has declined in the advanced economies in recent decades due to lower growth in the labour force, capital stock and productivity. Current projections and long-term growth expectations suggest that the low rates of potential growth in advanced economies will persist for some time.

To assess economic performance, economists often estimate potential output and potential growth. Potential output is typically defined as the highest level of output an economy can sustain in the medium term without generating excess inflation (Andersson *et al* 2018). Actual GDP growth rates can vary due to temporary factors, such as natural disasters. Estimates of potential growth attempt to abstract from such temporary fluctuations. Other variations in actual growth are longer lasting, such as those from the development and adoption of new technologies or demographic changes, and can cause changes in potential growth.

Policymakers are interested in potential growth and the level of potential output for a number of

reasons. The output gap – the difference between actual output and potential output – is a key indicator of inflationary pressures. Growth in potential output helps policymakers understand what rate of growth the economy can sustain in the medium term and provides useful guidance for GDP growth forecasts. Estimates of potential output also help to assess the underlying fiscal position of the government because they can be used to adjust measures of tax revenues and government spending for the effects of the business cycle (Girouard and André 2005). From the perspective of the Reserve Bank, estimates of potential output and potential growth in overseas economies help in assessing the economic conditions in our trading partners. They can also represent a basis for

comparison that provides insights into the determinants of potential growth in Australia.<sup>[1]</sup>

GDP growth in advanced economies has slowed over the past four decades (Graph 1). In most advanced economies, average GDP growth since 2000 has been ½ to 1 percentage points lower than the growth recorded over the preceding two decades. Part of the sluggishness in growth since the global financial crisis reflects the typical experience of slow recoveries after deep financial crises (Reinhart and Reinhart 2010), but it also reflects slowing growth over a longer period. The slowdown in potential growth pre-dates the global financial crisis and some have argued that it started as far back as the 1970s (Fernald *et al* 2017).

In this article, we examine a variety of estimates of potential growth for the advanced economies. We discuss how potential growth in these economies has evolved. We also discuss the difficulties in measuring potential growth and propose a method for quantifying the uncertainty in potential growth estimates using revisions to past estimates. Taking into account this uncertainty when assessing current growth against potential growth is important because it is difficult to estimate potential growth accurately in real time.

### Measuring Potential Growth

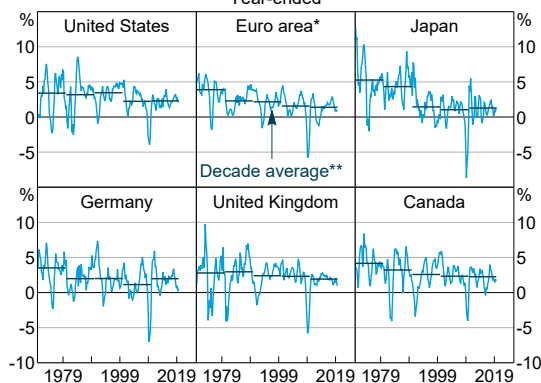
There are a variety of approaches to measuring potential output and potential growth. The *univariate approach* uses statistical techniques to

decompose output into trend and cyclical components; the trend component is assumed to be potential output. The *multivariate approach* treats potential output, the output gap, or potential growth as unobserved variables whose values are inferred from the behaviour of other observed variables, such as inflation and the unemployment rate, that are related to potential output. For example, when inflation falls below the central bank’s target for a sustained period, these methods would generate higher estimates for potential output. These methods for estimating potential output originated with Okun (1962) and they continue to be used (for example, see Blagrove *et al* 2015); their key advantage is that they more closely align with the definition of potential output. Both the univariate and multivariate approaches provide little information about what drives the changes in the growth in potential output.

*Growth accounting* is another method to estimate potential growth. It does so by splitting potential growth into its three main supply-side sources: employment, the capital stock and total factor productivity (TFP). The trend in each supply-side component is estimated separately; for example, the labour component assumes that the economy is at full employment and that the participation rate is at its sustainable level. The individual supply-side components are then aggregated, usually with a simple Cobb-Douglas production function, to give an estimate of potential growth.<sup>[2]</sup> While this approach allows us to get a better understanding of the drivers of potential growth, it still requires the estimation of the trends in many variables, which can be challenging as discussed later.

A range of estimates of potential growth are available for the advanced economies. Some of these are provided by international organisations such as the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF) and the European Commission (EC), which construct them using similar growth accounting based approaches.<sup>[3]</sup> National agencies, such as the Congressional Budget Office (CBO) in the United States, and some central banks also provide estimates for potential growth (see for examples,

**Graph 1**  
**GDP Growth**  
Year-ended



\* PPP GDP-weighted average of France, Germany, Italy and Spain  
 \*\* 80 per cent trimmed mean to control for volatility during recessions and initial stages of recoveries  
 Sources: IMF; RBA; Refinitiv

CBO (2014), Agopsowicz *et al* (2018) or Holston, Laubach and Williams (2017)). The potential growth measures from the various sources are generally very similar, which at least partly reflects that they are estimated using similar methods.

### How Has Potential Growth Evolved?

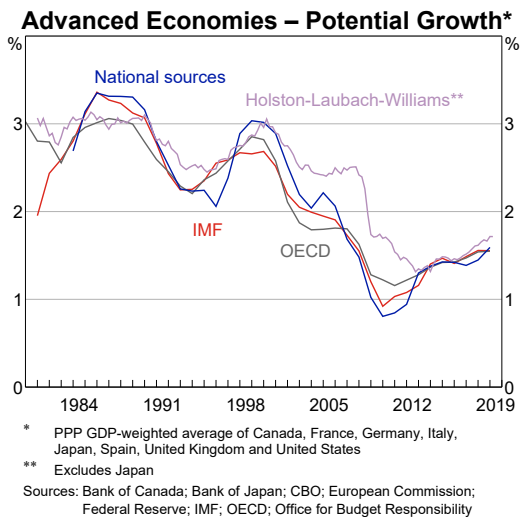
Potential growth in the advanced economies has declined steadily since the mid 1980s (Graph 2). The decline was interrupted in the late 1990s and early 2000s, when potential growth increased possibly because of widespread adoption of information and communication technology led by the United States (Jorgenson, Ho and Stiroh 2008). The decline accelerated during the global financial crisis because the crisis had long lasting economic effects. Although potential growth has picked up a little since 2013, it is currently only around half its rate in the mid 1980s.

The decline in potential growth has been broad based across the advanced economies (Graph 3). It has been most pronounced in Japan due to slowing population growth and the related slowing in capital accumulation. This has caused Japan's potential growth to decline from around 4 per cent in the early 1990s to be a little below 1 per cent recently. Potential growth has declined the least in the euro area, including Germany, from around 2 per cent in the 1980s to around 1½ per cent because population growth has not slowed as sharply as in other economies; although, population

growth and potential growth are lower in the euro area than in some other large advanced economies.

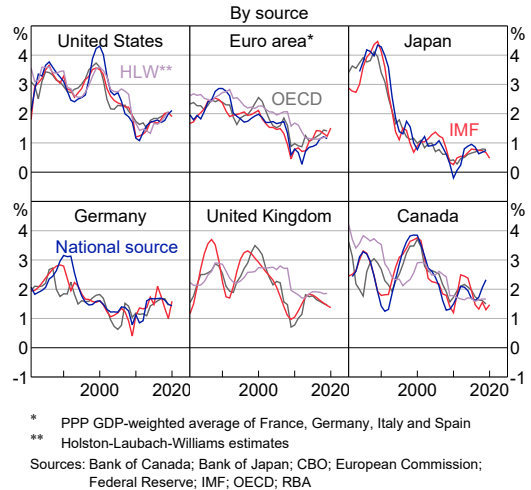
Another related measure of trend economic growth is the longer-run forecast of GDP growth made by professional economists. Economists' forecasts for growth over shorter horizons are affected by the business cycle, while their forecast over longer horizons mainly reflect their views of (future) potential growth. Economists' longer-run growth forecasts for the advanced economies have declined since the late 1980s to a similar degree as the estimates for potential discussed above (Graph 4).

**Graph 2**



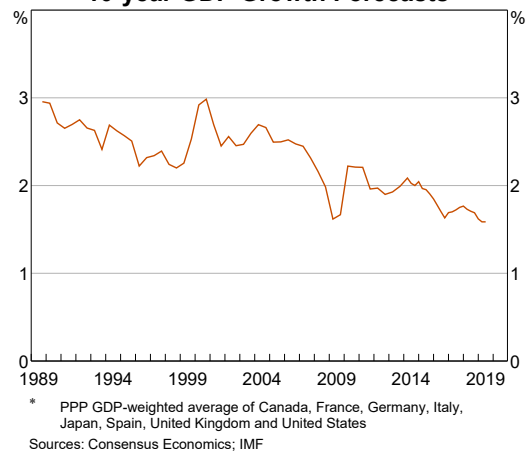
**Graph 3**

**Potential Growth Estimates**



**Graph 4**

**Advanced Economies – 10-year GDP Growth Forecasts\***



## Why Has Potential Growth Declined?

The slowdown in potential growth in the major advanced economies over the past four decades has been driven by slower growth in each of the three supply-side factors: employment, capital stock and TFP (Graph 5). In relative terms, the slowdowns in the United States and the euro area are mainly explained by lower potential employment growth. In Japan, the slowdown is largely due to slower capital accumulation, even though Japan, unlike the other advanced economies, has also experienced a decline in the level of potential employment.

### Potential employment

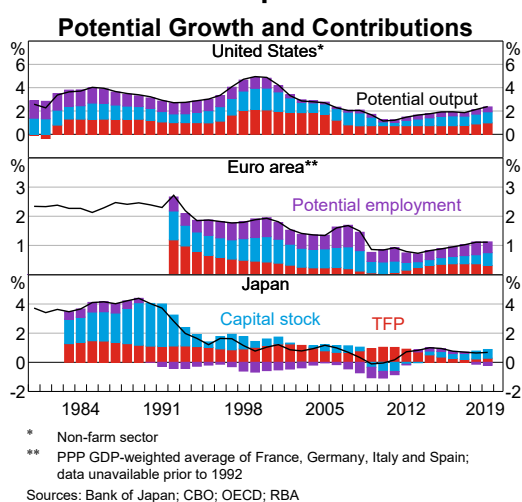
Potential employment measures the labour supply in the economy, adjusted for cyclical variations, that is consistent with stable inflation. Potential employment can be decomposed into the product of the working-age population, the trend participation rate, (one minus) the non-accelerating inflation rate of unemployment (NAIRU) and the trend average hours worked. Slowing population growth and ageing have lowered working-age population growth rates in most of the advanced economies (Graph 6). The effects of this on potential employment have been partially offset in some economies by an increase in the share of the working-age population working or looking for work (i.e. higher participation rate) and a decline in the level of unemployment consistent with stable inflation (i.e. lower NAIRU). On balance, however, potential

employment growth has declined, which has weighed significantly on potential growth in the advanced economies.

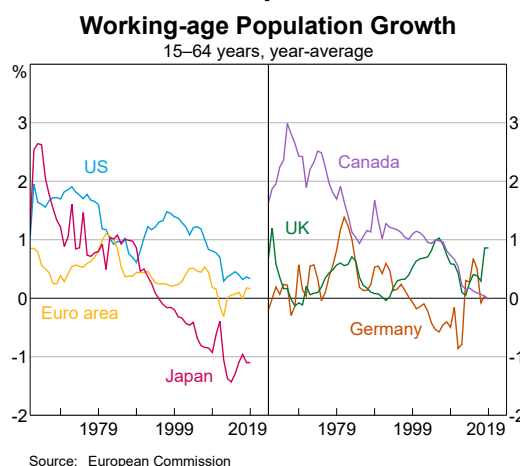
The demographic drag has been the largest in Japan, where potential employment declined during much of the 1990s and 2000s. Since 2014, however, the rapid and persistent increase in female employment in Japan has had an offsetting effect. More generally, increasing female participation has boosted labour supply across the advanced economies since well before the 1980s (Graph 7). The extent of this has varied across countries and time. The boost in the United States occurred earlier than in the other advanced economies and ended by the early 2000s, but is continuing in most other economies. Participation in the labour market by older workers (those 65 years or older) has also increased over the past two decades, after declining in the 1970s and 1980s. The population in the advanced economies is expected to continue ageing, which will further lower potential employment growth due to older workers leaving the labour force as they retire. Further increases in older workers' participation are unlikely to fully offset this effect on labour supply (Brown and Guttman 2017).

The boost to potential employment from the increase in participation rates has been muted by a decline in the average number of hours that employed people are working. This is because females and older workers, whose participation has increased, are more likely to be in part-time employment (Graph 8). Average hours worked have

**Graph 5**



**Graph 6**



declined the most in the euro area and Japan where the increase in participation by these population groups has been the largest; the decline in average hours worked in European countries may partly reflect changes to tax and transfer policies that have reduced incentives to work longer hours (Prescott 2004).

Potential employment has also been supported recently by the decline in estimates of the NAIRU in advanced economies (Graph 9). Estimates for the NAIRU have declined in part because the reductions in unemployment rates have not been accompanied by as much inflation as expected since the financial crisis (these estimates have also been revised significantly, see discussion in *The Uncertainty of Potential Growth Estimates* section). The decline in estimates of the NAIRU raises potential employment and output because a larger

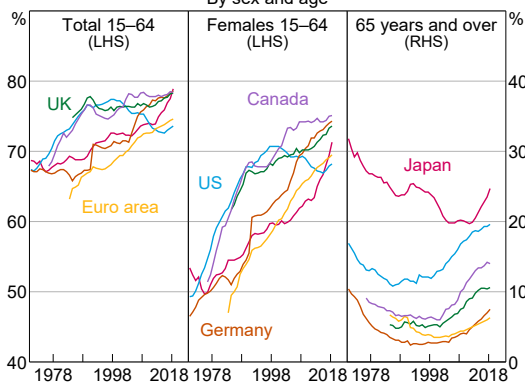
share of the labour force could be sustainably employed.

**Capital stock**

Lower trend growth of the capital stock has also weighed on potential growth in the major advanced economies since the 1980s. The slowing in capital accumulation has been the sharpest in Japan, with its contribution to potential growth falling from around 3 percentage points to be slightly negative in the early 2010s; capital accumulation has increased more recently in Japan, making ½ percentage point contribution to potential growth since 2014. Trend growth in the capital stock has declined as well in the United States and the euro area, reducing the contribution of the capital stock to their respective potential growth rates by around ½ percentage point. Much of the decline in investment has come from public and residential investment rather than business investment (Graph 10).<sup>[4]</sup>

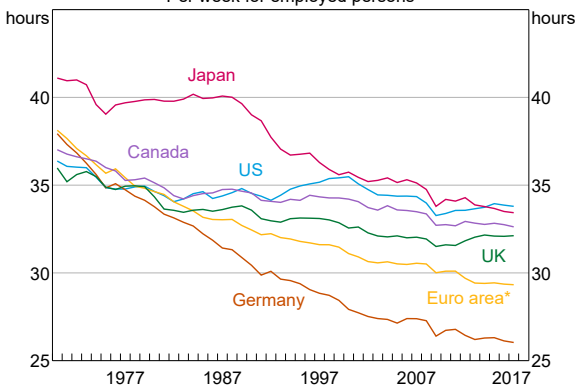
The slowing in the growth of the capital stock may be related to the slowing in population growth through two distinct channels. Firstly, lower growth in the labour force requires less growth in the capital needed to sufficiently equip the workers. Secondly, the slower growth in the population reduces the need to invest in new dwellings and public infrastructure. Some of the reduction in residential investment, as a share of GDP, is related to the global financial crisis, and has been most apparent in the United States and parts of the euro

**Graph 7**  
**Participation Rate**  
By sex and age



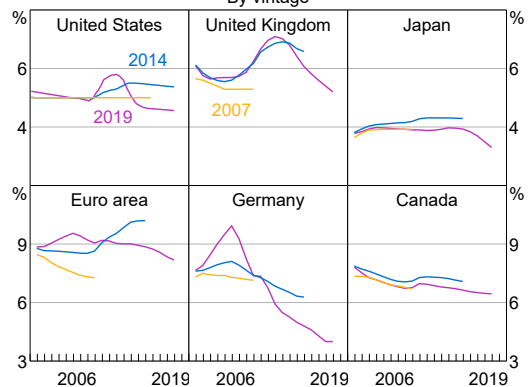
Sources: OECD; RBA

**Graph 8**  
**Average Hours Worked**  
Per week for employed persons



\* PPP GDP-weighted average for France, Germany, Italy and Spain  
Sources: Penn World Table; RBA

**Graph 9**  
**NAIRU Estimates\***  
By vintage



\* Congressional Budget Office estimates for United States and OECD for other economies  
Sources: CBO; OECD; RBA; Refinitiv



area where residential investment was at elevated levels in the mid 2000s. The decline in public investment may also reflect more conservative management of public finances following the accumulation of government debt in recent decades.

### Productivity

Trend growth in TFP, and its contribution to potential growth, has declined since the 1960s, but the experience has varied significantly across the major advanced economies (Graph 11). Trend TFP growth increased noticeably in the United States in the late 1990s and early 2000s alongside the large-scale uptake of information and communication technology. US TFP growth has declined over the past decade but has been only a little below its rate in the 1970s. The decline in TFP growth is more obvious in Japan since the 1980s. The reasons for the lower productivity growth across advanced economies are still debated. Some have argued that productivity is driven by the widespread adoption of new technologies, and that most transformative technologies have been already invented and adopted (Gordon 2012). Others have focused on the role of government policies in encouraging innovation (for example see, Herkenhoff, Ohanian and Prescott (2018), Glaeser and Gottlieb (2009), Backus (2019) or Pike (2018)).

Weakness in investment and productivity may be related. For example, insufficient investment to replace depreciated infrastructure could increase congestion and lower investment in research and

development could also lower productivity growth (Guellec and van Pottelsberghe de la Potterie 2003). Lower productivity growth may have also reduce incentives for business investment because it lowers expected returns on new investments.

### The Uncertainty of Potential Growth Estimates

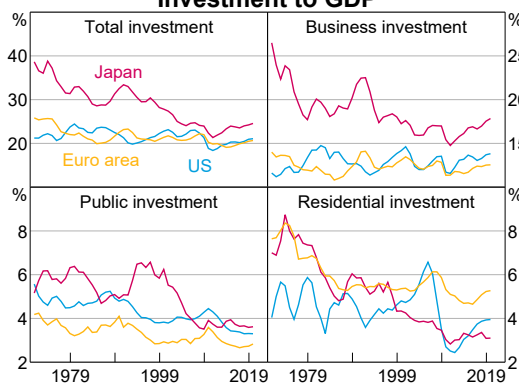
Estimating potential growth is difficult because it requires an assessment of trend developments in real time. These estimation challenges are clear when focusing on the growth accounting approach, but all potential growth estimation methods face some challenges of this kind.

Potential employment requires estimates of the working-age population, trend participation rate and the NAIRU.<sup>[5]</sup> Estimating trend participation is difficult because labour force participation can be affected by the cyclical conditions in the economy and the trend estimates need to adjust for this. Estimating the NAIRU is challenging in its own right and estimates are highly uncertain (for example, see Cusbert (2017) or Crump *et al* (2019)).

Measuring the capital stock is difficult and the measurements are imprecise, which compounds the difficulty in estimating its trend growth.<sup>[6]</sup> For example, firms are likely to invest when they are operating closer to their full capacity and when they assess demand conditions to be strong. This makes investment procyclical, which increases the difficulty of discerning the trend growth rate of capital.

**Graph 10**

**Investment to GDP**

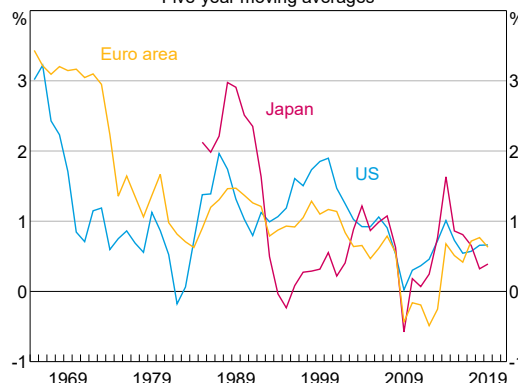


Sources: RBA; Refinitiv

**Graph 11**

**Total Factor Productivity Growth**

Five-year moving averages



Sources: European Commission; RBA; Refinitiv

Estimating trend productivity is even more challenging. In practice, TFP is measured as the residual in GDP growth that is not explained by the growth in labour and capital inputs (Harberger 1998). In addition, the fact that capacity utilisation varies over the business cycle can introduce procyclicality in estimated trend TFP growth (Fernald and Wang 2016). An example of this difficulty is in the experience in the United States, where estimated potential output growth was high in the late 1990s due to increased investment in information technology and the lift in productivity from the wider adoption of this technology. Potential growth estimates for this period were revised higher in the early 2000s because it took some time before the increase in productivity was fully recognised. By the time potential growth was revised higher, the period of faster growth was coming to an end.

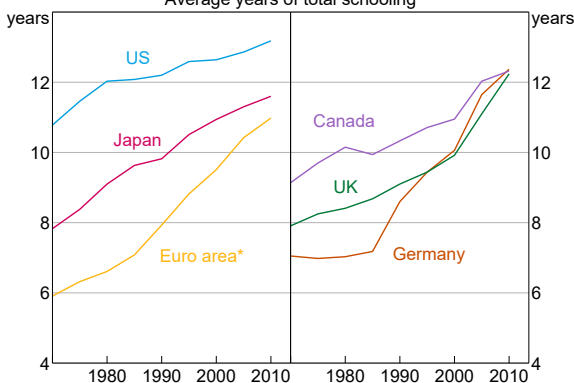
Trend productivity growth is partly determined by human capital (the quality of labour), which increases the efficient utilisation of physical capital by the labour force. Measuring human capital is difficult and, in practice, it is usually done with proxies such as average years of schooling or completion rates across different education levels (Graph 12). Given the measurement difficulties, trends in human capital accumulation are not usually explicitly accounted for when estimating potential growth which may lead to mismeasurement of potential growth when education trends change.

The difficulty of discerning the effects of longer-lasting structural forces from those of temporary cyclical factors can lead to estimates of potential growth rising and falling with the business cycle. A recent example is the large downward revisions to potential growth and output in the wake of the global financial crisis. Most potential growth estimates for 2009 to 2012 were revised lower as GDP declined sharply in many economies and the recovery was sluggish. The more recent estimates for this period have been revised up, although they remain well below the pre-crisis potential growth estimates. Rather than this being an isolated problem, this episode highlights the systematic difficulty in estimating potential growth. Coibion, Gorodnichenko and Ulate (2018) have argued that the popular estimates of potential growth systematically respond to temporary shocks. Such biases in potential growth estimates suggest that they should be used with caution, and the uncertainty in the estimates should be taken explicitly into account when using them.

The IMF’s real-time estimates for potential GDP growth, like other estimates for potential growth, are revised regularly and significantly as can be seen from the shaded areas in Graph 13, which show the range of estimates for potential growth at each point in time since 2000. To quantify how estimates for potential GDP growth vary over time, we use a pooled sample of the IMF’s estimates published from 2000 to 2019. The estimates tend to stabilise within about five years of their initial publication, which suggests that the size of the revisions at that point is a useful measure of the uncertainty in the potential growth estimates. The IMF has typically revised its potential growth estimates within a range of –1 to 0.5 percentage points within the first five years after its initial publication (Graph 14).<sup>[7]</sup> For example, if the IMF’s estimate in 2000 for that year’s potential growth was 3 per cent, five years later, we would generally (with 90 per cent confidence) expect the estimate for potential growth in 2000 to have been changed to between 2 and 3½ per cent. Estimates for potential growth were more likely to have been revised lower, at least for the period for which we have data (i.e. from 2000 to 2019). This may reflect the slowing in

**Graph 12**

**Educational Attainment**  
Average years of total schooling



\* PPP GDP-weighted average of France, Germany, Italy and Spain  
Source: Barro, Robert and Jong-Wha Lee (2013), A New Data Set of Educational Attainment in the World, 1950-2010

**Table 1: Current GDP Growth and Potential Growth Estimates**

Select advanced economies, per cent

	Potential growth		Current GDP growth
	Point estimate	70 per cent interval <sup>(a)</sup>	Year-ended <sup>(b)</sup>
United States	2.0	1.5–2.3	2.0
Euro area	1.1	0.6–1.4	0.9
Japan	0.6	0.1–0.9	1.4
Germany	1.3	0.7–1.5	0.5
United Kingdom	1.5	0.9–1.8	1.0
Canada	1.7	1.2–2.0	1.7

(a) Based on historical revisions after five years

(b) Year-ended growth to September 2019

Sources: IMF; RBA; Refinitiv

potential growth during the period, which took some time to be fully recognised in the estimates. The estimated level of uncertainty is significant, especially in the context of the current estimates for potential growth in the advanced economies that for the most part are in the range of 1 to 2 per cent. The uncertainty in the potential growth estimates appears to be larger in some economies such as the United Kingdom.

Comparing the IMF's current potential growth estimates for 2019 with the latest observed GDP growth rates shows that most large advanced economies are growing around potential because their current GDP growth rates are within the 70 per cent interval based on the size of historical revisions (Table 1). Japan is currently the only major advanced economy growing significantly above

potential, while Germany is growing significantly below its potential rate.

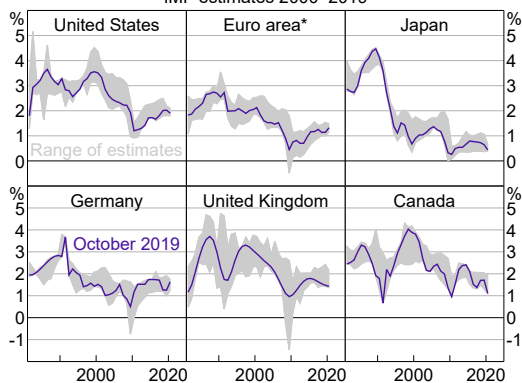
### Conclusion

The level of and growth in potential output are useful concepts, although they are difficult to estimate accurately. Estimates of potential growth have been subject to sizeable revisions after their initial publication. Notwithstanding the uncertainty about the estimates, the overwhelming evidence is that potential growth in the advanced economies has declined since at least the mid 1980s. The decline has been driven by slower population growth and ageing, slower investment growth and weaker productivity. ❖

**Graph 13**

**Potential Growth Revisions**

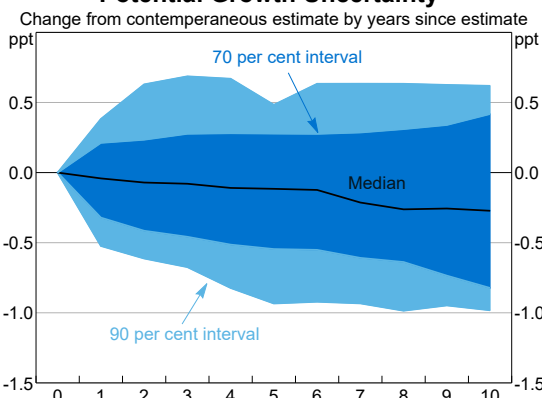
IMF estimates 2000–2019



\* PPP GDP-weighted average of France, Germany, Italy and Spain  
Sources: IMF; RBA

**Graph 14**

**Potential Growth Uncertainty\***



\* IMF estimates from 2000 to 2019 for Canada, France, Germany, Italy, Japan, Spain, United Kingdom and United States  
Sources: IMF; RBA

## Appendix

**Table 2: Sources of Potential Growth Estimates**

For advanced economies

	Countries	Method	Update frequency
IMF	Advanced economies and some emerging economies	Growth accounting measure, aggregated using Cobb-Douglas production function	Semi-annual
OECD	Advanced economies	Growth accounting measure, aggregated using Cobb-Douglas production function	Annual
European Commission	28 members of European Union	Growth accounting measure, aggregated using Cobb-Douglas production function	Semi-annual
Bank of Canada	Canada	Growth accounting measure, aggregated using Cobb-Douglas production function	Quarterly
Bank of Japan	Japan	Growth accounting measure, aggregated using Cobb-Douglas production function	Quarterly
Federal Reserve Bank of New York (Holston-Laubach-Williams)	Canada, euro area, United Kingdom, United States	Multivariate estimator	Quarterly
Congressional Budget Office	United States	Growth accounting measure, aggregated using Cobb-Douglas production function	Semi-annual
Office for Budget Responsibility	United Kingdom	Multivariate estimator	Annual
Japan Cabinet Office	Japan	Growth accounting measure	Quarterly

## Footnotes

- [\*] Authors are from Economic Analysis Department. The authors are grateful to Joan Zhang for her excellent assistance with collating some of the data used in the article.
- [1] The article focuses on the advanced economies because potential growth estimates are less readily available for emerging markets. The article does not examine developments in Australia's potential growth. For more information on Australian potential growth, see Lancaster and Tulip (2015).
- [2] A Cobb-Douglas production function assumes that labour and capital make up a fixed share of the economy and that they can be aggregated together with some exogenous technology to produce output. For more information on the use of the Cobb-Douglas production function and estimates of potential output, see Miller (2008).
- [3] The OECD and EC use uniform methodology and so does not account for differences across economies (OECD 2019) and (Havik *et al* 2014). The IMF does not publish potential per se, but publishes output gaps which measure the difference between actual GDP and potential output. The IMF's estimates for potential output reported in this article are backed out of the IMF's estimates for the output gap by the authors. Unlike the OECD, the IMF estimates account for country-specific factors (Masi 1997).
- [4] The treatment of the housing stock differs across the various sources of potential output estimates. Some estimates, such as the OECD's, exclude housing from the capital stock, while others, such as the CBO's, include it in the capital stock. Even when it is not included in the potential capital stock, the housing stock produces housing services which are included in actual GDP and as such the contributions of the housing stock to potential growth would be captured in the measures of potential TFP.
- [5] It should be noted that even working-age population, which is a slow moving variable that can generally be estimated with some precisions, can also be subject to large revisions. Population censuses provide the most complete picture of demographics but they are infrequent. Between censuses, working-age population needs to be estimated and occasionally these estimates may be revised with substantial implications. For example,

following the 2011 census, Germany's working-age population was revised down by around 2 per cent because this was the first census conducted following the reunification of West and East Germany (Kulish and Cottrell 2013).

[6] The change in the capital stock is measured by adding the gross investment and subtracting depreciation from the

previous period's estimate for the capital stock. This requires an assumption about the economic depreciation rate, which is not readily available and is typically assumed to be constant.

[7] IMF vintages are available since 2000 only.

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# The Nature of Australian Banks' Offshore Funding

Kellie Bellrose and David Norman<sup>[\*]</sup>



Photo: jayk7 – Getty Images

## Abstract

Australian banks access large and deep foreign funding markets to supplement their domestic funding. Looking at the major banks' worldwide operations, such offshore funding accounts for about one-third of their assets. This funding is raised in a variety of ways, across several countries and by various entities within the banking groups. While offshore funding can create vulnerabilities, these are appropriately mitigated by various factors. It would nonetheless be desirable for banks to continue to lengthen the maturity of their offshore debt securities.

## Background

Large banks source funds from a wide range of countries, in addition to attracting domestic deposits. This enables them to diversify their funding sources, access deeper and more liquid markets and borrow for longer terms than they often can domestically. However, offshore funding can be riskier than domestic funding because it involves more 'rollover risk'.<sup>[1]</sup>

Rollover risk is inherent to banking. It arises because a core function of banks is to engage in maturity transformation by borrowing for short terms (including by issuing deposits) and lending for longer terms. In doing so, banks fulfil two critical

needs – for borrowers to have certainty about the security of their long-term financing commitments and for savers to have access to liquid assets to manage their cash flow.<sup>[2]</sup> Nonetheless, the risks involved in such maturity transformation must be adequately managed to prevent banks from failing.

There are two reasons why offshore funding involves more rollover risk than domestic funding. One is that investors tend to reallocate their portfolios away from foreign investments and towards domestic ones during times of stress in global financial markets. This increase in investor 'home bias' can make it especially hard to roll over offshore funding at such times.<sup>[3]</sup> The second

reason is that banks borrowing in foreign currencies often don't have access to central bank liquidity support in that same currency. Both of these issues were evident during the 2008 financial crisis, when European banks were unable to secure US-dollar funding (including from US money market funds and other US residents) until the US Federal Reserve extended a USD/EUR swap line to the European Central Bank.

These considerations are highly relevant for Australia's major banks, who obtain a large share of their funding from offshore wholesale markets. This has long been cited as a vulnerability by a range of commentators. Most recently, the IMF reiterated its concerns about Australian banks' use of offshore funding during the 2018 Financial Sector Assessment Program (FSAP) of Australia.<sup>[4]</sup> The IMF recommended that Australian authorities consider ways to ensure banks reduce their use of offshore wholesale funding and extend the maturity of their borrowing.

This article describes how Australian banks access offshore funding, with a view to better informing about the risks that such borrowing creates. In doing so, we look at funding of banking groups as a whole. This comprises three different business units: the Australian-based operations (which is typically the focus in past work, given the data for this part of banks' businesses are more detailed); banks' subsidiaries in other countries (mostly New Zealand, where all four majors have operations); and their branches in various offshore locations.<sup>[5]</sup> Where possible we separate funding sourced by banks' subsidiaries from the other two, because subsidiaries can access local deposits and liquidity support from the Reserve Bank of New Zealand, which changes the nature of the liquidity risks they face. Initially, we examine the funding composition of all banks operating in Australia in aggregate, before confining our more in-depth analysis to the four major Australian banks. This is largely because of the availability of data but also because the international exposure of most other Australian banks is very small.

## Offshore Funding Composition

Since the financial crisis, banks operating in Australia have made their funding more stable by adjusting their funding composition. In particular they have reduced the share of funding coming from short-term debt markets and increased the share coming from deposits (Graph 1; left panel). This shift was initially triggered by the realisation in 2008 that liquidity risk was more significant than had previously been believed, and was subsequently reinforced by the introduction of the Liquidity Coverage Ratio (in 2015) and the Net Stable Funding Ratio (in 2018).<sup>[6]</sup> Despite this shift, wholesale debt still funds around one-third of Australian banking activity, of which nearly two-thirds (or 20 per cent of total funding) is acquired from offshore wholesale debt markets (Graph 1; right hand panel). This funding is a combination of Australian-owned banks accessing offshore markets and foreign-owned banks that operate in Australia funding themselves in part via their parents (or non-resident customers).

The data in Graph 1 only capture the Australian-based operations of banks. This is the appropriate scope when thinking about domestic financial conditions and monetary policy transmission, but it is incomplete when considering issues of financial stability such as funding risk. This is because the resilience of banks is determined by the entity as a whole, and almost 25 per cent of Australian-owned banks' assets are located outside of Australia. Of this, around 10 percentage points are held by foreign subsidiaries (most notably in New Zealand), with the remaining 15 percentage points held in offshore branches.

There are some modest but important differences between the funding of banks' domestic activity and their groups as a whole. Graph 2 captures a snapshot of the major banks' *group-level* funding composition by combining both their Australian-based operations and their overseas-based operations (both subsidiaries and branches). This broader coverage results in two interesting differences compared with the domestic-only focus (which is shown as dots in Graph 2, corresponding to the last observation in Graph 1):

- The share of deposit funding is somewhat lower, at just over 50 per cent of total group funding. This is unsurprising given that foreign branches tend to be restricted in their ability to accept deposits. The flip side of this is that the share of short-term and long-term debt is somewhat higher when considering the group as a whole.
- The major banks' share of offshore funding is higher when considering the group as a whole. Offshore funding is one-third of total operations (up from 20 per cent depicted in Graph 1).

Further insights on the riskiness of banks' funding come from focusing on the 30 per cent of this

group funding that is sourced from offshore investors (Graph 3). This funding is quite evenly split between deposits, short-term debt and long-term debt. However, most of the offshore deposits are raised by banks' foreign subsidiaries while almost all of the offshore debt is raised by either the Australian-based operations or banks' foreign branches.

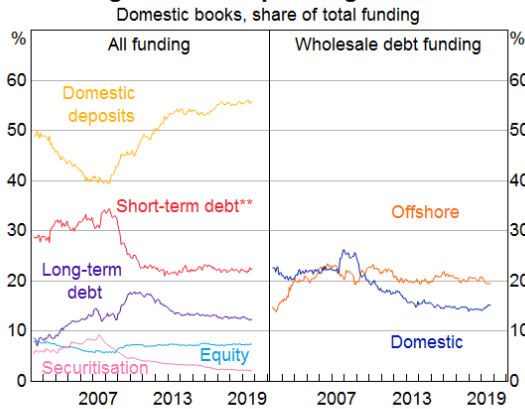
### Offshore deposits

Deposits from offshore entities (excluding financial institutions) account for a bit over 10 per cent of total group funding of the major banks.<sup>[7]</sup> Around 60 per cent of this is sourced from banks' foreign subsidiaries through retail and small and medium enterprise (SME) customers (Graph 4). The remainder are placed by non-financial corporations (NFCs), mostly in the majors' Australian operations and foreign branches. (While we are unable to confidently break this down further, available data suggest that the split is approximately half and half between Australian-based operations and foreign branches). A sizeable portion of these NFC deposits are used for investment purposes, rather than to fund the NFC's regular operations, and are therefore prone to runs in periods of perceived or actual stress.<sup>[8]</sup> In that way, these offshore deposits may not be too different to offshore debt securities.

Banks' offshore deposits are sourced from a broad range of countries. Naturally, the largest share comes from banks' New Zealand subsidiaries

**Graph 1**

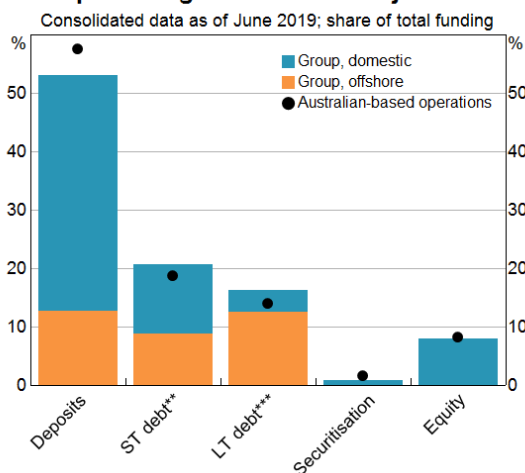
**Funding of Banks Operating in Australia\***



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

**Graph 2**

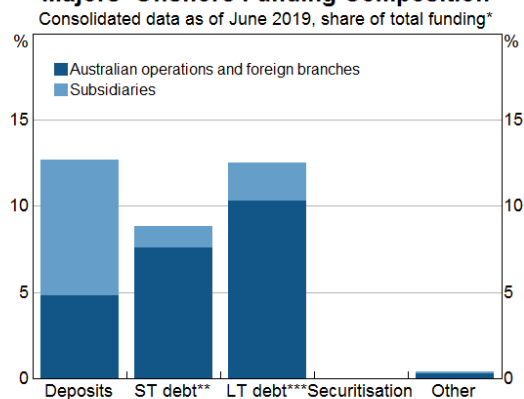
**Group Funding of Australian Major Banks\***



\* Tenor of debt is estimated on a residual maturity basis (remaining years to maturity)  
 \*\* Includes ADIs and financial institution (FI) deposits, and repo securities  
 \*\*\* Includes covered bonds  
 Sources: ABS; APRA; Bloomberg; RBA; Refinitiv; Standard & Poor's

**Graph 3**

**Majors' Offshore Funding Composition**



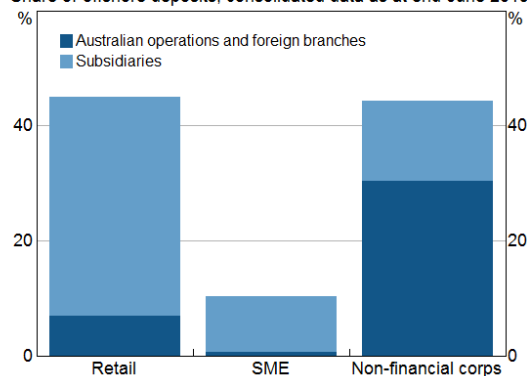
\* Tenor of debt is estimated on a residual maturity basis (remaining years to maturity)  
 \*\* Includes ADIs and financial institution (FI) deposits, and repo securities  
 \*\*\* Includes covered bonds  
 Sources: APRA; RBA

(Graph 5). But banks also secure offshore deposits through their branches in a range of other countries. (Note that we cannot exclude deposits by financial institutions from the data by country, as done above.) Deposits by non-residents in the majors' Australian-based operations also come from counterparties that are resident in a wide range of countries. However, the bulk of these are from residents of the United States, various Asian countries and the United Kingdom. A large portion of deposits from non-resident financial institutions are denominated in US dollars, while other non-residents (especially households) are more inclined to hold Australian dollar-denominated deposits (Graph 6).

**Graph 4**

**Majors' Offshore Deposit Funding by Sector\***

Share of offshore deposits, consolidated data as at end-June 2019

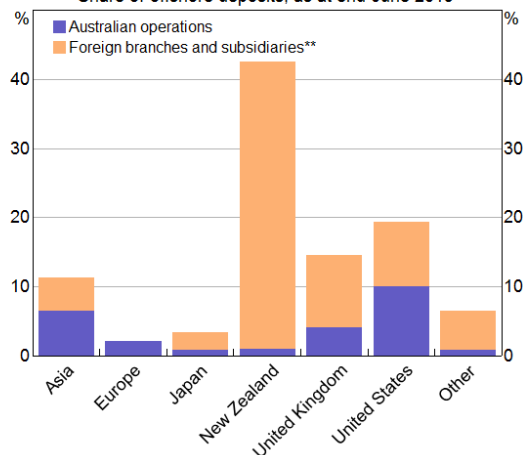


\* Excludes financial institution (FI) deposits  
Sources: APRA; RBA

**Graph 5**

**Majors' Offshore Deposit Funding by Region**

Share of offshore deposits, as at end-June 2019



\* Includes financial institution (FI) deposits  
\*\* Overseas branch operations which includes deposits by foreigners in offshore branches  
Sources: APRA; RBA

**Offshore wholesale debt**

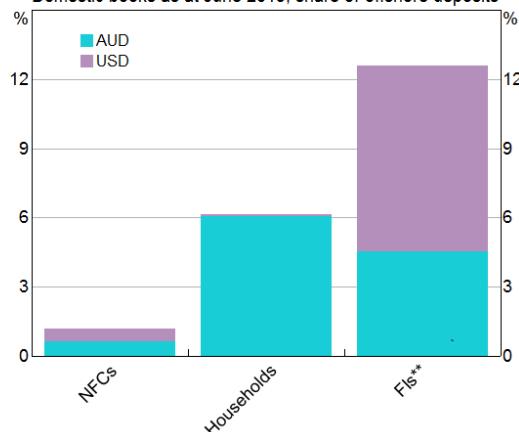
Wholesale debt (both debt securities and wholesale deposits) issued overseas or held by foreigners account for around 20 per cent of total funding for major Australian banks.<sup>[9]</sup> Of this, almost 50 per cent is long-term debt (both unsecured and long-term covered bonds; Graph 7).

The majority of offshore debt securities are raised by the Australian-based operations and are used to fund domestic banking (Graph 8). However, around 20 per cent of total offshore debt securities are issued by the majors' foreign branches or their New Zealand subsidiaries. The United Kingdom and

**Graph 6**

**Majors' Non-resident Deposits by Currency\***

Domestic books as at June 2019, share of offshore deposits

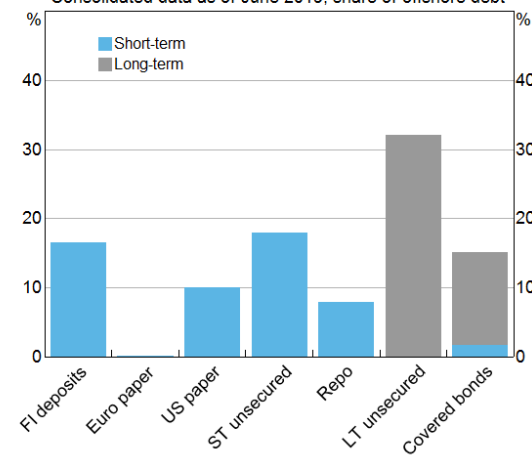


\* Excludes related offices  
\*\* Financial institutions (FIs) includes deposits from ADIs, non-banking financial institutions (NBFIs) and central banks  
Sources: APRA; RBA

**Graph 7**

**Majors' Offshore Wholesale Debt Composition**

Consolidated data as of June 2019, share of offshore debt



\* FIs includes deposits from banks and non-bank financial institutions  
Sources: APRA; RBA

United States' markets are by far the main locations for the groups' debt security issuance. About half of this is denominated in US dollars (Graph 9).<sup>[10]</sup> A sizeable share is also issued in euros, primarily out of London and most likely to European-based investors.

The remaining ('residual') maturity of banks' bonds is an important consideration for rollover risk, as it determines the amount of bond funding that must be refinanced each year to support a stable asset base. The average residual term to maturity for offshore bonds issued by Australian banks has risen in recent years, from 3.5 to 4.5 years (Graph 10). However, this is still well below the average residual

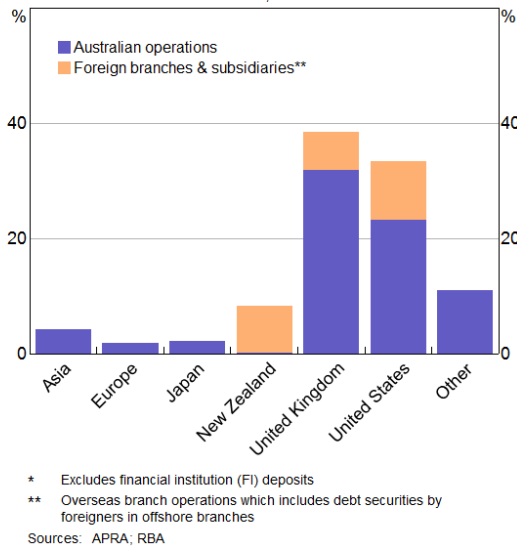
maturity of bond issuance by most other developed countries' banks, with the exception of Canada and Sweden. This is despite US, European and UK banks raising a larger share of their debt from home country investors, meaning they face less risk from home bias than Australian banks.

Australian banks find it difficult to obtain foreign exchange hedging contracts for tenors longer than 10 years, making it unattractive to issue such long-term bonds. However, this does not appear to be the reason why they have a shorter average residual maturity than banks in other countries. In particular, the share of Australian bank bonds issued offshore that have very long maturities (greater than 10 years) is very similar to that of other banks issuing in US dollars and euros (including by banks resident in the United States and Europe).<sup>[11]</sup> Rather, the reason Australian bank bonds have a shorter residual maturity than those of other banks issuing in the same market is that they have much fewer bonds with a medium term residual maturity (that is, 5–10 years; Graph 11).

While Australian banks' offshore bond maturities are shorter than those of many other developed economies' banks, they are longer than the maturities of their domestic issuance (Graph 12). In particular, outstanding domestically issued bonds very rarely have a residual maturity of more than five years. This illustrates that offshore funding can in fact provide benefits in reducing rollover risk.

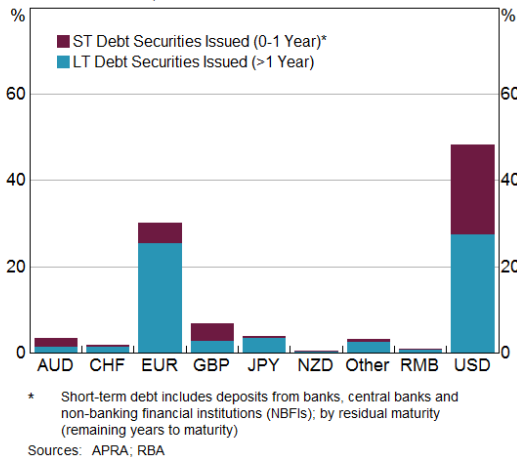
**Graph 8**

**Majors' Offshore Debt Funding by Region\***  
Share of offshore debt, as at end-June 2019



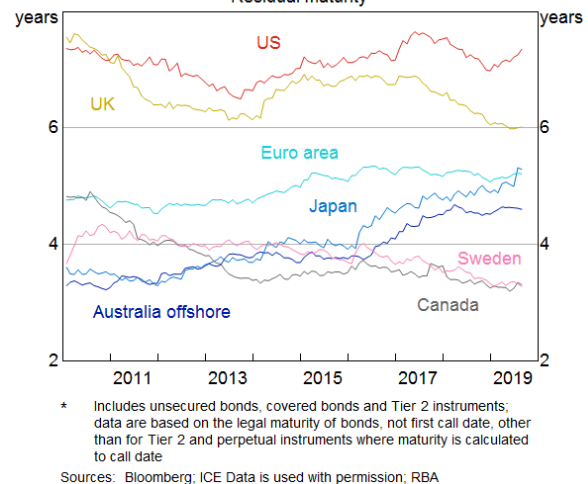
**Graph 9**

**Majors' Offshore Debt by Currency**  
Domestic books, share of offshore debt as at end-June 2019



**Graph 10**

**Weighted Average Term of Bank Bonds\***  
Residual maturity





## How Risky is Offshore Funding?

The degree of rollover risk for banks depends on both the characteristics of their funding and that of the assets this funding is used to acquire. In particular, banks can comfortably operate with more 'flighty' sources of funding if their assets are also of shorter duration or are more liquid. A bank operating in this way can then respond to difficulties rolling over maturing funding by selling liquid assets or refusing to rollover maturing assets. That latter response can have significant implications for Australian financial stability if those assets are facilitating domestic economic activity, but this is less likely to be problematic if those assets are located offshore. Given this, we next look

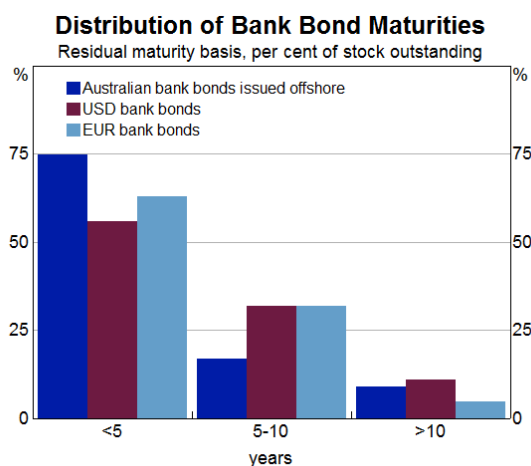
at the type and maturity of the assets banks acquire with their offshore funding.

Offshore assets held by the Australian majors' account for around 25 per cent of their consolidated assets (Graph 13). Around 10 percentage points of this are loans written by banks' New Zealand subsidiaries, a further 5 percentage points is loans written by foreign branches and the rest is a combination of high quality liquid assets (HQLA) and repurchase agreements (repo) written by banks' foreign branches. The remaining gap between offshore funding and offshore assets implies that around one-quarter of offshore funding (almost 10 per cent of total group assets) is also used to write Australian-based assets.

The maturity profile of these offshore assets can also be used to determine the extent of maturity mismatch banks face on their offshore funding. Banks relying on retail at-call deposits and with access to central bank liquidity support will naturally do more maturity transformation than other banks because the run-risk on retail deposits is much lower than on other forms of funding. For this reason, we confine our scope to exclude banks' offshore subsidiaries, who fund themselves mainly from retail deposits and have access to liquidity from the Reserve Bank of New Zealand.

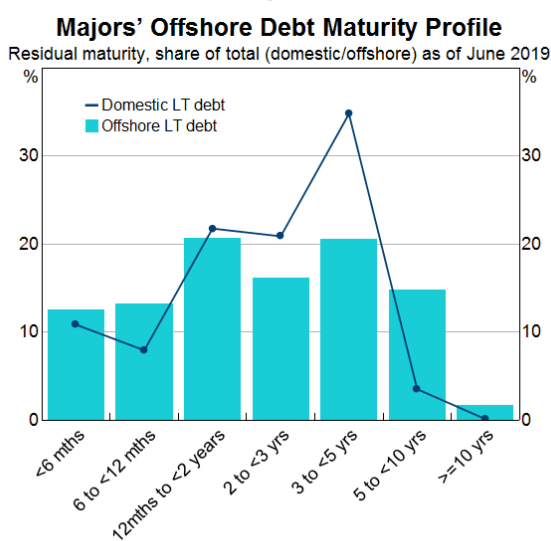
Graph 14 shows that the major banks have about \$95 billion more offshore liabilities than offshore assets maturing at a short time horizon (within the next 30 days). While this maturity mismatch is

**Graph 11**



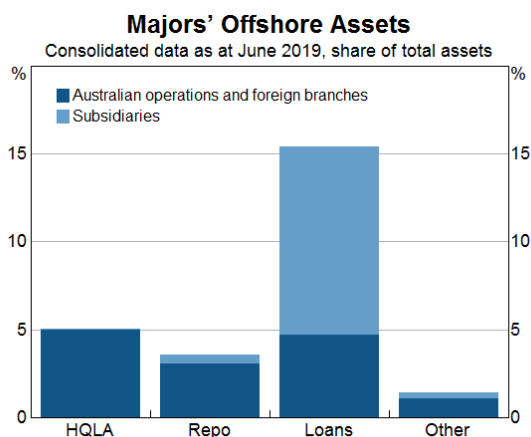
Sources: ICE Data used with permission; RBA

**Graph 12**



Sources: APRA; RBA

**Graph 13**



Sources: APRA; RBA

conventional for banking, 'home bias' risks inherent in offshore funding add an additional complexity to net funding pressures than if it was created by domestic retail deposits. However, a significant share of the resulting shortfall is covered by their offshore HQLA, which often has a long maturity but can typically be liquidated quickly with little discount. Banks have additional HQLA in Australia (amounting to \$200 billion) that could also be used to meet an offshore funding shortfall, since a sizeable portion of this foreign funding is used to acquire Australian dollar assets. These holdings are an important mitigant of banks' vulnerability to liquidity risk on offshore funding.

A few other factors also reduce the risks that Australian banks face because of their offshore funding. They include:

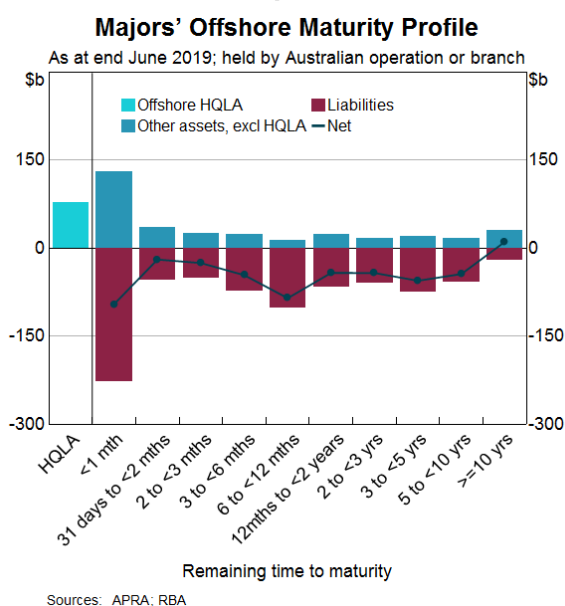
- *Exchange rate hedging* – Australian banks hedge their foreign-currency denominated funding back to Australian dollars when it is used to fund Australian dollar (AUD) assets.<sup>[12]</sup> These hedges also typically match the average duration of their funding. This hedging ensures that the net value of FX-denominated liabilities will not rise when the Australian dollar depreciates.
- *Supportive margin calls* – it is likely that any closure of foreign funding markets to Australian banks would be associated with a depreciation of the Australian dollar, given the importance of

Australian banks for the country's international capital flows and the historically negative correlation of the AUD with risk appetite. An immediate implication of this is that derivative counterparties would need to post additional margin against their cross-currency swap positions with Australian banks. In liaison, banks note that the size of these margin calls could be enough to cover a significant share of the funding shortfall implied by Graph 14. A second implication is that banks' requirements for offshore funding would decline in foreign currency terms, to the extent that they are used to fund AUD-denominated assets. This would allow Australian banks to reduce their call on offshore funding without limiting their ability to write AUD-denominated loans.

- *Offshore borrowing funds domestic assets* – Australian banks use a sizeable portion of their offshore funding to acquire AUD assets (along with liquid and short-term assets), not FX-denominated ones. This is a key distinction to how offshore funding was used by European banks that experienced severe funding difficulties at the onset of the financial crisis.

One reason why this matters is that, in the event of a retreat by foreign investors, a portion of the AUD that they were supplying to Australian banks is highly likely to still be transmitted to Australian banks via other means. In other words, even if a foreign entity was to pull assets out of Australia, the AUD is simply transferred from one party to another and thus still remains within the domestic banking system. For example, foreign investors wanting to shed their exposure to AUD by swapping these into other currencies might transact with Australian entities (such as superannuation firms) seeking to shed their exposure to foreign currency.<sup>[13]</sup> When these Australian entities then either place these funds on deposit or invest them locally with other entities that place the money on deposit, much of the initial AUD will still find its way to Australian banks as a deposit.<sup>[14]</sup> However, it is unlikely that all of these funds will be smoothly transmitted to Australian banks in another form during a time of stress; in

**Graph 14**



particular, the price of that funding could be significantly higher.

- *Liquidity assistance* – as a last resort, the RBA can ultimately provide liquidity to Australian banks against eligible collateral. This is possible because Australian banks primarily require Australian dollar funding, not foreign-currency-denominated funding. Given their self-securitised loans, the major banks potentially have a large pool of eligible collateral to secure funding from the RBA, if the Bank is prepared to lend against it at the time.

## Conclusion

Looking across the major Australian banks' worldwide operations, rather than just their Australian-based activities as has historically been done, we find that offshore funding accounts for around one-third of the major banks' total funding, evenly split between deposits, short-term and long-term debt. A significant portion of this is raised by their New Zealand subsidiaries, and does not pose the same rollover risk as other foreign funding. Of the remainder, some is raised by banks' Australian-based operations and some is raised by their foreign branches in a wide range of countries. This funding is often in US dollars (in many cases swapped back to Australian dollars), but sizeable amounts are also raised in euros and Australian dollars. The maturity of the majors' offshore bonds is longer than they can issue domestically, but still shorter than that of other banks issuing in the same markets.

Abstracting from their New Zealand activities, Australian banks largely use these offshore borrowings to fund short-term or liquid foreign assets, while repatriating a sizeable portion to fund Australian loans. In doing so, they face a rollover risk if foreigners refuse to renew this funding during periods of stress. However, a number of factors mitigate the risk that this vulnerability could create severe funding shortages for these banks.

Given these mitigating factors, the Council of Financial Regulators (CFR) recently concluded that it was not necessary to introduce measures to discourage Australian banks from using offshore funding. However, it agreed that a further

lengthening of the maturity of their offshore borrowing would reduce the rollover risk for banks and the broader financial system.

## Appendix – Data used in this article

Authorised deposit-taking institutions (ADI) in Australia are required to report data on their balance sheet and profitability to the Australian Prudential Regulation Authority (APRA). This information is collected under various reporting standards and is used by APRA for the purpose of prudential supervision and by the RBA for understanding financial conditions and systemic risk.

ADIs are required to provide APRA with information at three consolidation levels (Figure 1):

1. *Domestic books* consolidation – this captures positions and transactions recorded on the Australian books of reporting entities. This includes Australian-owned and -based operations and Australian-based branches of foreign banks.
2. *Level 1* consolidation – this includes all Australian-owned and based operations, as well as overseas-based branches of Australian-owned ADIs. It does not include any information for foreign-owned banks operating in Australia.
3. *Level 2 or Group-level* consolidation – this includes Level 1 consolidation, plus overseas-based offshore banking subsidiaries of the ADI. Unlike branches, subsidiaries operate as a separate legal entity that holds its own capital and are prudentially regulated in their host country.

## Reporting forms used in this analysis

In the past, most analysis has utilised domestic books data, using ABS/RBA Statement of Financial Position forms (ARF\_720.0A).

This article uses Group-level (Level 2) data obtained from the *Contractual Maturity Mismatch - Funded Assets; Funding Liabilities & Capital* forms (ARF 210.3.1; ARF 210.3.2). These datasets collect information on the contractual maturity profile of funded assets, funding liabilities and capital of an ADI. It is to be completed at a *Level 1* and *Level 2*

basis for locally incorporated ADIs. (Foreign ADIs only report these data on a domestic books' basis.)

Information that identifies banks' offshore branches or subsidiaries separately from the domestic books are sourced from the *International Operations* forms (ARF 325.0).

To gain information about funding in different currencies, and the country split of debt securities issued by the domestic books of major banks, we use *locational International Banking Statistics (IBS)*

*data* (ARF 731.1). IBS data are comprised of the international assets and liabilities of all banking offices located in Australia; that is, they are on a domestic books' basis. The locational data measure the international positions of Australian banks on an unconsolidated basis. This means they exclude the assets and liabilities of the foreign operations of Australian-owned banks but include cross-border positions between offices of the same banking group (intragroup positions). ❖

## Footnotes

[\*] The authors are from Financial Stability Department.

[1] Offshore funding includes money raised from non-residents and/or debt securities issued in a market other than the Australian domestic market.

[2] See Ellis (2016).

[3] For more information on how home bias can strengthen when financial conditions tighten, see Gianetti and Laeven (2012).

[4] The FSAP reports for Australia can be found at <<https://www.imf.org/external/np/fsap/fsap.aspx>>.

[5] Appendix A contains a more precise definition of these three different units of consolidation.

[6] Similar trends have been seen on a global scale. For more information, see CGFS (2018).

[7] Deposits from financial institutions are classified as short-term debt, since they behave similarly to debt and are treated as debt under regulation.

[8] Liquidity regulations treat operational deposits (those that customers use for transactional purposes) differently to other (non-operational) deposits. Non-operational deposits are considered to be more likely to run in stress conditions and, for NFC's, therefore attract a 100 per cent run-off rate.

[9] This figure understates foreign ownership of the major banks' debt securities, because it only captures bonds

issued in a market other than Australia. ABS data show that a further \$50 billion of bonds issued in Australia are owned by foreigners. (As a share of total consolidated funding, this equates to 1½ per cent.)

[10] This graph is on a domestic books basis due to data constraints. Given that a significant portion of offshore debt funding is from Australian-based operations, this is likely to be similar to the distribution on a group basis.

[11] It is not possible to get reliable data, across a wide range of countries, on the distribution of bank bond maturities by the *nationality* of issuing banks. However, we can access such data for Australian banks, and for the currencies in which global and Australian banks most commonly issue bonds (US dollars and euros).

[12] See Berger-Thomson and Chapman (2017).

[13] This trade might occur because of a 'home bias' on the part of Australian residents, or because an AUD depreciation leaves them over-allocated to foreign currency-denominated assets. Note that there could also be some steps in this process: for example, a (foreign) hedge fund could facilitate the initial exchange of FX to AUD. But as long as the hedge fund then invests those AUD it will still find its way to Australian residents.

[14] This argument is closely related to the 'loans create deposits' argument. See Kent (2018) and Doherty, Jackman and Perry (2018) for a fuller discussion.

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# Conditions in China's Corporate Sector

Joel Bowman<sup>[\*]</sup>



Photo: ispyfriend – Getty Images

## Abstract

Revenue and profit growth have slowed in China's corporate sector in recent years, alongside a broader moderation in China's economic momentum. The slowdown has been most severe for labour-intensive private companies, particularly export-oriented manufacturing firms. The government has responded by announcing a range of measures aimed at easing financial conditions faced by the private sector. Earlier efforts by the Chinese authorities to reduce risks in China's financial system appear to have been successful in stabilising leverage in the state-owned sector, but the financial position of private sector firms is more fragile, and risks remain elevated in the real estate industry.

## Introduction

Conditions in China's corporate sector are important for Chinese economic growth and financial stability, and have significant implications for China's major trading partners, including Australia. Chinese business investment has been an important source of economic growth, and driven demand for resource commodities. However, by the same token, the corporate sector has been the largest contributor to non-financial sector leverage, and corporate debt remains very high by international standards. Analysis of the activities and financial health of China's companies is also helpful for forming assessments about the broader trajectory

of the Chinese economy and the effectiveness of government policies affecting businesses.

A range of previous studies has examined conditions in China's corporate sector.<sup>[1]</sup> These analyses have documented the decline in corporate profitability and rise in leverage since 2008–09, which stemmed from the rapid increase in debt-funded investment that formed part of the Chinese Government's stimulus response to the Global Financial Crisis (GFC).

This article provides an update on recent developments by drawing upon official industrial survey data. However, the official survey data only cover a limited number of industries and are restricted to

companies above a certain size.<sup>[2]</sup> Therefore, for more detailed sector-level analysis, this article uses alternative data derived from the financial statements of listed companies. As at the end of 2018, more than 3,300 non-financial companies were listed on the Shanghai and Shenzhen stock exchanges, with a combined value of CNY58 trillion in assets.<sup>[3]</sup> Listed companies represent a relatively small but growing share of China's broader corporate sector: these firms accounted for around 10 per cent of non-financial enterprise assets in 2016 and around 10 per cent of non-financial corporate debt in 2018.

### Revenue and Profit Growth Has Weakened, Driven by the Private Sector

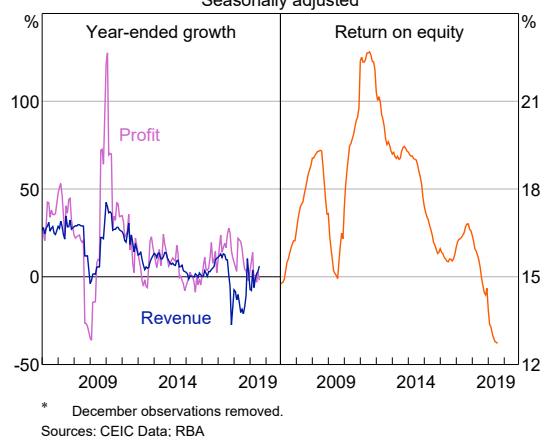
A range of indicators suggests that growth in revenue and profits of Chinese firms has slowed noticeably in the past few years. The profitability of industrial firms captured in the official industrial survey had been trending lower following the 2008–09 stimulus. In large part, this downward trend reflected the fact that returns to new large capital outlays declined following the extremely large boost to investment that occurred during the period of stimulus. Profitability rebounded in 2016 and 2017 following government efforts to reduce overcapacity, leverage and the cost of doing business, under the policy framework of 'Supply-side Structural Reform' (see Boulter 2018). However, in the past two years, growth in revenue and profits has moderated again, and the return on equity has trended sharply lower (Graph 1).

A similar pattern has been apparent for listed companies (Graph 2). The recent slowdown in operating revenue and profit growth reported by both listed and unlisted companies suggests that, in aggregate, supply-side policies were only temporarily able to limit the downward pressure on business profits. Moreover, the slowdown appears to have been exacerbated by efforts by Chinese regulators to reduce risks in the financial system; these efforts have resulted in a squeeze on less-regulated sources of credit, which private firms are more reliant on. The deterioration in profitability is also likely to be related to a broader slowdown in

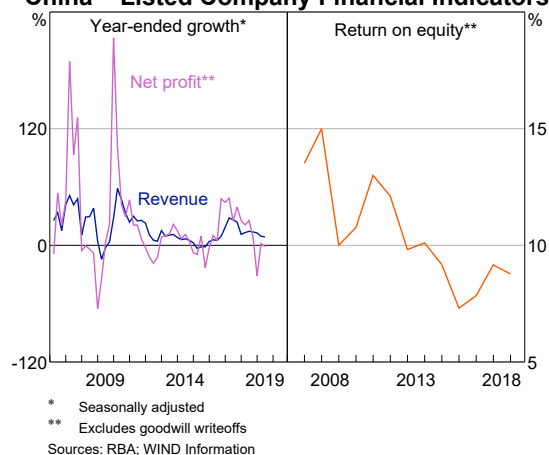
global manufacturing and trade that has weakened the cash flow of export-oriented firms.

The more granular ownership and industry-level data reported by listed companies allow us to analyse the drivers of the slowing in corporate sector profitability in more detail. The data suggest that the slowing since 2017 has been driven by private companies (Graph 3).<sup>[4]</sup> By contrast, the profitability of state-owned enterprises (SOEs) has been trending higher. It is likely that the profitability of SOEs has continued to be supported by the government's implementation of supply-side policies, since the high leverage and excess capacity characterising these firms made them the primary target of these policies. SOEs have responded by reducing their investment expenditure and have reduced excess capacity, particularly in the mining

**Graph 1**  
China – Industrial Sector Financial Indicators\*  
Seasonally adjusted



**Graph 2**  
China – Listed Company Financial Indicators



industry, which has helped boost profitability. The exception has been for SOEs in the construction industry: their return on equity has declined as they reduced their leverage, but their profits relative to assets have been little changed. By contrast, the profitability of listed firms in the manufacturing and services industries, which are dominated by private firms, has generally declined.

The slowdown in revenue and profits has occurred across all the sub-components of manufacturing. The profitability of car manufacturers has also been severely affected by tighter emissions standards, which have forced manufacturers to reduce production of models designed to old standards faster than they can increase production of cars designed to the new standards (Cui 2019). The falling profitability of listed services industry firms appears to be related to slowing growth in consumer spending; the decline in profitability has been particularly acute for the accommodation, entertainment and retail industries.

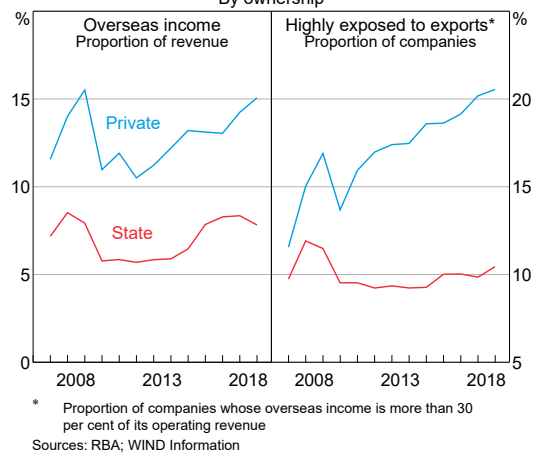
### The Private Sector Has Been Most Exposed to the Global Trade Slowdown

The deteriorating profitability of private companies, particularly manufacturing firms, in China is partly related to global developments. The global slowdown in trade, underpinned by weaker growth in some advanced economies and exacerbated by the US–China trade and technology disputes, is likely to have weighed on corporate cash flows, particularly for export-oriented manufacturing firms.

Listed private companies receive a noticeably higher proportion of their revenue from offshore than SOEs, and this has been increasingly the case over time (Graph 4). This is also reflected in the fact that the proportion of China's exports coming from the private sector has increased from 5 per cent in 2000 to 45 per cent in 2018, while the contribution from SOEs has declined (Graph 5). In 2019, around 70 per cent of listed exporting firms were private. This means that private firms are more directly exposed than SOEs to downside risks emanating from trade tensions or to a broader slowdown in global trade.

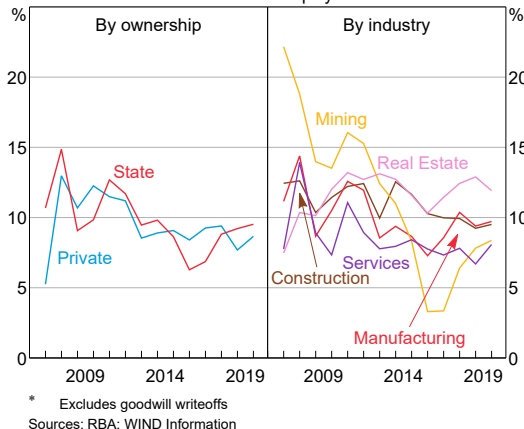
Downward pressures on profits stemming from the global trade slowdown are starting to weigh on employment in the private sector. The activity of

**Graph 4**  
China – Listed Company Export Reliance  
By ownership



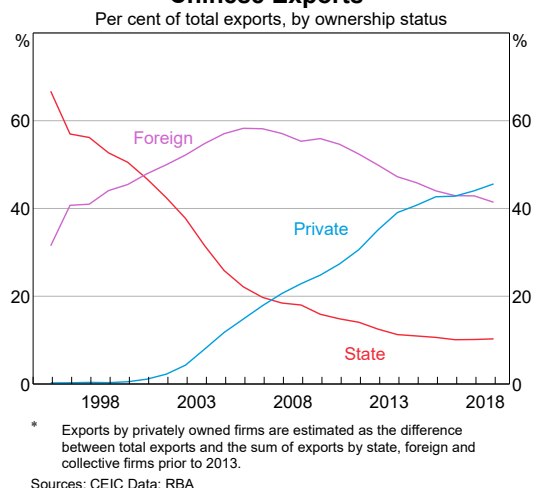
**Graph 3**

China – Listed Company Profitability\*  
Return-on-equity



**Graph 5**

Chinese Exports\*



highly export-oriented firms is relatively more labour intensive than that of firms with low export exposure (Graph 6). Exporters have responded to the slowdown in trade by reducing their labour intensity. This is likely to have contributed to job losses; surveyed employment in the export-oriented industrial sector contracted by 10 per cent in 2018 according to official data.

### Leverage Has Fallen for SOEs but Risen for Private Firms

Corporate sector leverage, measured by the debt-to-equity ratio, has stabilised in the past few years (Graph 7). The amount of leverage among SOEs has declined reflecting the success of supply-side policies, which were reinforced by the introduction of deleveraging as a key performance metric for centrally supervised SOEs (State Council 2018). By contrast, leverage among private firms, particularly in the real estate sector, has risen.

Leverage has been declining over recent years in the construction and mining industries, which is largely driven by SOEs. Some of this deleveraging, particularly in the mining industry, may have resulted from the implementation of supply-side policies designed to reduce excess capacity. The reduction in excess capacity is likely to have contributed to increased profitability of remaining firms, increasing their scope to reduce leverage. The reduction in leverage among listed construction

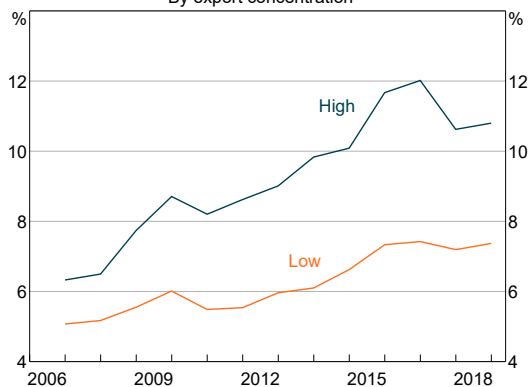
firms has also been supported by cash flows being directed away from capital expenditure and towards debt repayment. Leverage in the manufacturing and services industries – which are dominated by private firms – has moderated since the early 2010s but has been stable for the past couple of years.

Leverage remains elevated in the real estate industry, having increased strongly over a number of years, but has been stable since the beginning of 2017. However, conventional leverage measures, such as the debt-to-equity ratio, do not fully capture the financial risks facing property developers, because they exclude non-debt liabilities such as pre-sold apartments (Graph 8). Accounting for both debt and non-debt liabilities, data on financing flows for both listed and unlisted Chinese real estate developers suggest that they had at least CNY25 trillion in debt outstanding by mid 2019 (27 per cent of GDP).<sup>[5]</sup> The authorities have imposed restrictions to curb the amount of financing directed to the real estate sector amid concerns that financing to other industries may be ‘crowded out’ (Guo 2019). Developers have responded by increasing new home starts and pre-sales, while delaying construction and extending delivery times to reduce near-term expenditure. This has increased the risk that developers could face financial pressure should they encounter a shortage of funding needed to deliver pre-sold homes. Increased regulation of real estate financing may help prevent leverage from ratcheting up further, but may also increase the sector’s

**Graph 6**

**China – Listed Company Labour Intensity\***

By export concentration\*\*



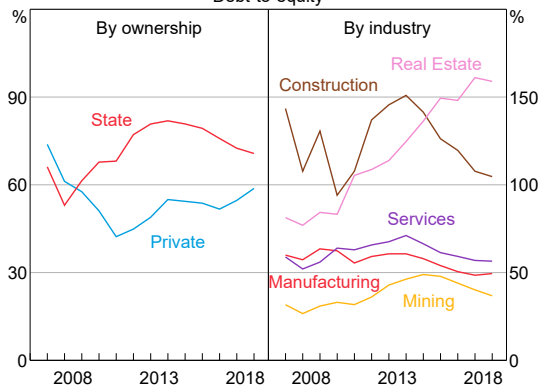
\* Labour concentration is measured by the ratio of cash paid to employees to operating revenue.  
 \*\* High export concentration is defined as companies whose overseas income is more than 30 per cent of its operating revenue. All other companies are defined as low export concentration.

Sources: RBA; WIND Information

**Graph 7**

**China – Listed Company Leverage**

Debt-to-equity



Sources: RBA; WIND Information

vulnerability to a negative shock. The risks appear larger for privately owned real estate firms, as the level and increase in leverage in recent years has been higher for these firms than for state-owned firms.

The squeeze on private sector cash flows is partly the result of a rebound in net receivables (accounts receivable less accounts payable) of private firms with SOEs (Graph 9). This has involved a transfer of liquidity from the private sector to SOEs. The rise in private sector accounts receivable implies that the financial position of SOEs is worse than suggested by standard leverage ratios that do not account for this type of liability. After stabilising in 2016 and 2017, the recent resurgence in private firms' net receivables is likely to reflect SOEs delaying payments to private suppliers to improve their own liquidity position. For private companies, the increase in net receivables from SOEs equates to 9 per cent of their stock of bank loans. The owners of listed private companies, especially smaller-sized firms, have responded to this tightening in financial conditions by pledging an increasing proportion of their equity as collateral to obtain funding.<sup>[6]</sup> The tightening of financial conditions has also contributed to a rise in corporate bond defaults by private enterprises (from low levels).

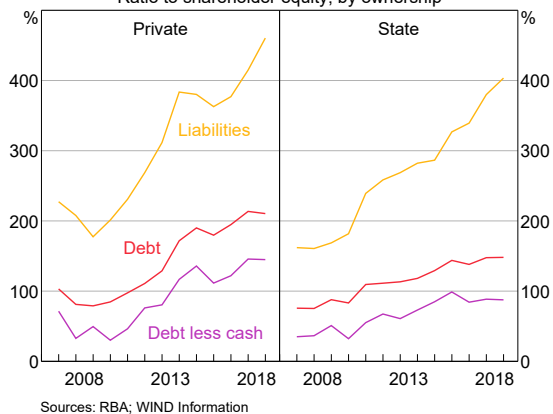
In addition, private companies typically pay higher interest rates than SOEs, which has increased their repayment burden and weighed further on their cash flows (Graph 10). As funding conditions in China have tightened in the past couple of years in response to tighter regulatory scrutiny by financial

supervisors, listed private firms have been affected disproportionately; implied interest rates for these firms increased more rapidly than for SOEs over 2018. Higher interest rates and falling profitability for private firms imply that their interest coverage ratio (how many times annual earnings can pay interest expenses) has deteriorated sharply while the interest coverage ratio for SOEs has improved.

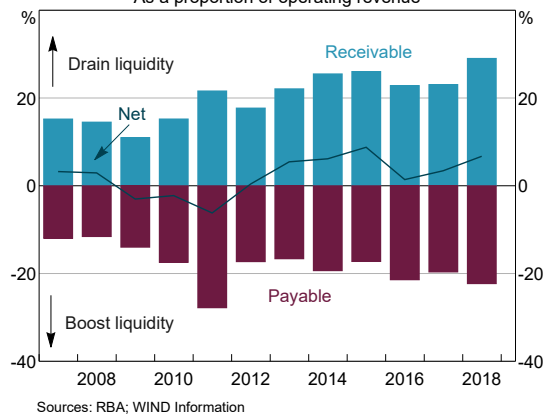
### Authorities Have Responded by Announcing Easing Measures Directed towards Private Firms

The Chinese authorities have enacted a number of targeted easing measures that are focused on easing the financial pressures facing private firms, particularly small-sized enterprises. Some of the key

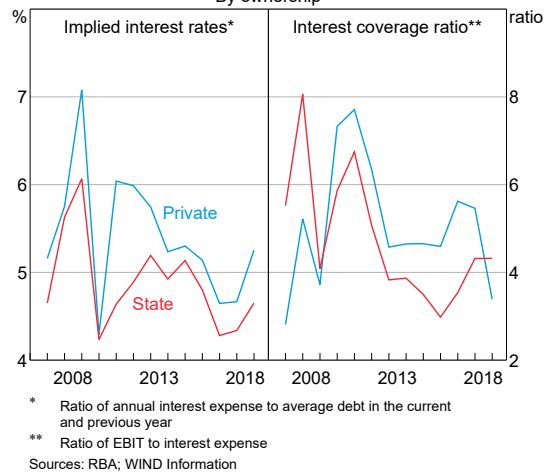
**Graph 8**  
**China – Listed Real-Estate Company Leverage**  
Ratio to shareholder equity, by ownership



**Graph 9**  
**China – Listed Private Companies Accounts**  
As a proportion of operating revenue



**Graph 10**  
**China – Listed Company Debt Metrics**  
By ownership





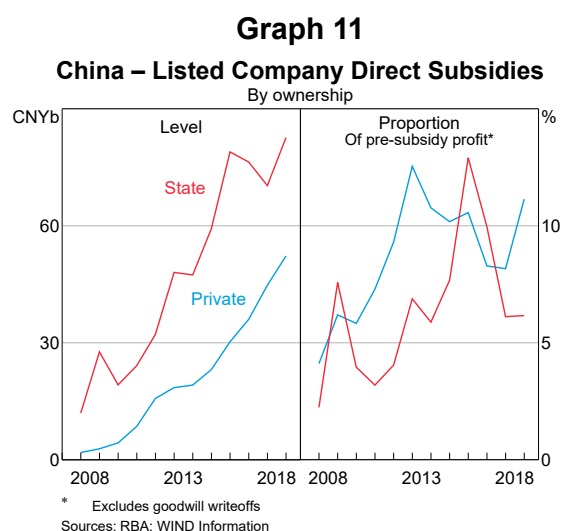
measures announced to date include the following:<sup>[7]</sup>

- Financial regulators have instructed banks to increase lending to private enterprises (Guo 2018).
- The People’s Bank of China (PBC) has increased liquidity provision to banks conditional on increasing the proportion of loans made to private enterprises.<sup>[8]</sup>
- Fiscal authorities have offered tax exemptions for interest income that financial institutions earn from making loans to micro- and small-sized firms, which are predominantly privately owned.
- China’s Premier Li Keqiang (2018) has instructed SOEs that they ‘must resolutely put an end to the arrears of private enterprise accounts’, to reduce the rising stock of accounts receivable owing to private companies.

The authorities have also supported private enterprises by steadily increasing the amount of direct government subsidies directed towards them. By contrast, the level of direct subsidies to SOEs has been little changed since 2015 (Graph 11). Historically, the ratio of direct subsidies to pre-subsidised profits has generally been higher for private companies than for SOEs. However, the authorities can also provide support to companies through other means; for example, many analysts believe that state firms receive loans on better terms from banks (Yi and Liang 2016). The extension of credit on preferential terms to SOEs could partly explain why SOEs have a lower implied interest rate on their debt, but it may also be partly because SOEs have a lower perceived credit risk than private firms (Fan and Hope 2013). The recent rise in private firms’ borrowing costs has occurred despite efforts by the authorities to lower these costs. This suggests that easing financial conditions for private firms may prove to be a challenging task for the authorities in practice.

## Conclusion

Revenue and profit growth have slowed in China’s corporate sector alongside the broader moderation in economic momentum, weighed down by tighter domestic financial regulation and the global trade slowdown. The decline in profitability has been driven by private enterprises, and is likely to have contributed to recent job losses in the industrial sector. Recent efforts by authorities to reduce risks in the financial system appear to have been effective in reducing leverage for SOEs. However, the standard leverage ratios are likely to overstate how much their leverage has declined, because they are accumulating large stocks of unpaid bills owed to private firms. The private sector appears to be most fragile at present, as reflected by reduced cash flows and rising average interest costs. This is despite increases in government subsidies to private companies and efforts to reduce the cost and increase the availability of bank financing to these enterprises. Risks also remain elevated in the real estate sector, where tighter regulation of financing flows has led developers to rely increasingly on non-debt liabilities such as pre-sales of apartments. ✎



## Footnotes

- [\*] The author is in Economic Analysis Department.
- [1] These include: Lam *et al* (2017); Laurenceson and Ma (2019); Read (2017); Roberts and Zurawski (2016); and Zhang *et al* (2015).
- [2] China's National Bureau of Statistics (NBS) publishes aggregate data on the financial position of industrial (mining, manufacturing and utilities), real estate and construction firms with annual revenue exceeding CNY20 million. The Ministry of Finance (MoF) publishes comprehensive data on the financial position of state-owned enterprises.
- [3] The data are sourced from financial statements collated by WIND Information. The data include all nonfinancial 'A' shares listed on the Shanghai and Shenzhen stock exchange. The sample is unmatched, so it includes all companies listed on the exchange at each point in time.
- [4] This work identifies state versus private firms using the ownership classification scheme from WIND Information. State companies include those classified as local or central state-owned companies and public enterprises. The ownership classification is time varying. In 2018, state owned companies' share of total listed company assets was 70 per cent, privately owned companies accounted for 27 per cent and foreign-owned companies accounted for less than 3 per cent.
- [5] This consists of CNY11 trillion of bank loans, CNY3 trillion of trust loans, CNY2 trillion of entrusted loans, CNY4 trillion of bonds outstanding and CNY6 trillion in deposits and advance payments.
- [6] For further details see IMF (2019).
- [7] Further details on the financing problems for smaller private businesses and policy response in China is articulated in a joint White Paper (PBC, CBIRC 2019).
- [8] Some of these instruments include a number of targeted reserve requirement ratio cuts, 'targeted' medium-term lending facility injections and increased quota for its rediscount window facility.

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# Developments in Foreign Exchange and Over-the-counter Derivatives Markets

Julie Guo, Dushan Ranasinghe and Zhan Zhang<sup>[\*]</sup>



Photo: Nikada – Getty Images

## Abstract

Global activity in foreign exchange (FX) and over-the-counter (OTC) derivatives markets increased over the three years to April 2019. Continuing a trend observed over prior years, growth in turnover of foreign exchange derivatives outpaced growth in spot market activity. Trading between dealers and other financial institutions accounted for a larger share of market activity than trading between FX dealers.

The Australian dollar remained the fifth most traded currency globally, although the volume of FX trading activity in the Australian market was little changed. Over the past three years, the growth of global and Australian OTC derivatives markets has been driven by interest rate derivatives.

The Bank for International Settlements (BIS) Triennial Central Bank Survey provides the most comprehensive information about the size and structure of global foreign exchange and OTC derivatives markets.<sup>[1]</sup> This article discusses the key results from the Triennial Survey. First, it examines trends in foreign exchange market activity by jurisdiction, currency, counterparty and instrument. It then analyses turnover in single-currency interest rate derivatives before providing an overview of developments in the size of OTC derivatives markets based on a number of measures.

## Foreign Exchange Turnover

Global foreign exchange turnover grew strongly over the three years to April 2019, rising by over 30 per cent to an average of US\$6.6 trillion per day (Graph 1).<sup>[2]</sup> The growth in turnover more than reversed the modest decline recorded in the 2016 survey, and coincided with a rise in the value of international trade over the same period (Graph 2). In contrast, global cross-border lending and investment have been little changed over recent years. While these macroeconomic factors continue to be key drivers of demand for foreign

exchange transactions, their overall influence on turnover is limited, especially in economies with well-developed financial systems. Consistent with this, a substantial portion of the growth recorded in the April 2019 survey was in market segments where foreign exchange activity is more closely related to managing financial risks, such as trading between reporting dealers and other financial institutions (particularly smaller banks, hedge funds and proprietary trading firms).

In contrast to a significant increase in global turnover, turnover in the Australian foreign exchange market was little changed in US dollar terms over the three years to April 2019. Turnover in the Australian foreign exchange market remains well below the levels seen earlier in the decade, in part reflecting the depreciation of the Australian

dollar over this period. More frequent data collected by the Reserve Bank of Australia indicate that in Australian dollar terms activity in the Australian foreign exchange market has been fairly stable since 2011.<sup>[3]</sup>

### Turnover by jurisdiction

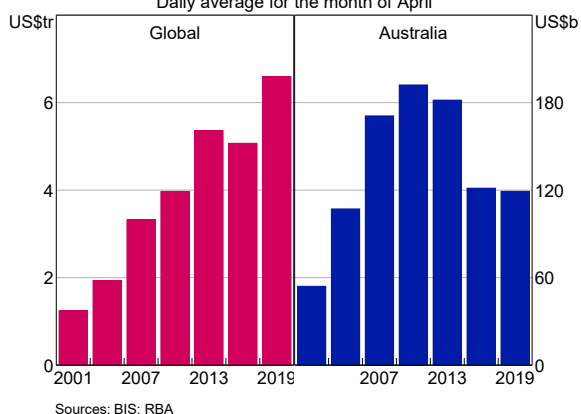
The global foreign exchange market continues to be highly concentrated geographically. The five largest jurisdictions accounted for just under 80 per cent of global turnover in April 2019; this share has increased steadily since 2007 (Table 1, Graph 3). The United Kingdom remains the largest trading centre and accounted for a large share of the increase in global turnover over the three years to April 2019. The United States remained the second largest centre, but its share declined as turnover grew more slowly than the global results.

Several Asian jurisdictions have increased in importance as centres for foreign exchange trading over recent years. After recording a sharp increase in turnover between 2013 and 2016, the three largest Asian centres – Singapore, Hong Kong and Japan – maintained their global share at around 20 per cent in the April 2019 survey. Strong growth in Hong Kong offset relatively slower growth in Tokyo and Singapore. China also recorded an increase in trading activity, though it still accounts for a smaller global share than Hong Kong. China is now the eighth largest foreign exchange trading centre (up from 13th in April 2016). The gradual increase in

**Graph 1**

### Foreign Exchange Turnover

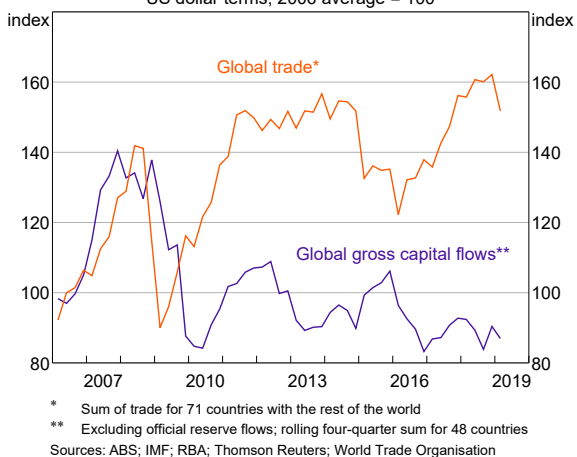
Daily average for the month of April



**Graph 2**

### Global Trade and Gross Capital Flows

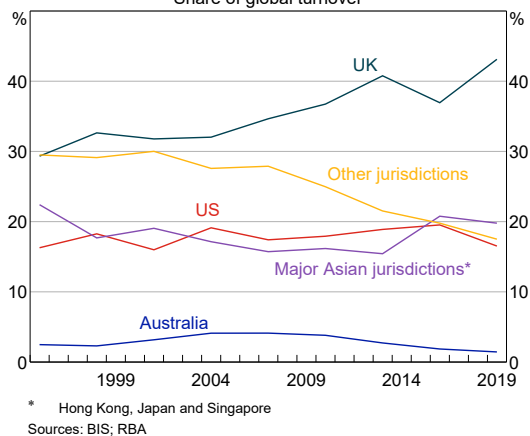
US dollar terms, 2006 average = 100



**Graph 3**

### Geographical Distribution of Foreign Exchange Turnover

Share of global turnover



**Table 1: Global Foreign Exchange Turnover by Jurisdiction<sup>(a)</sup>**

	Daily average April 2019 US\$ billion	Change over 2016–2019 Per cent	Market share April 2016 Per cent	April 2019 Per cent
<b>Total</b>	<b>6,590</b>	<b>30</b>	<b>n/a</b>	<b>n/a</b>
United Kingdom	3,576	49	36.9	43.2
United States	1,370	8	19.5	16.6
Singapore	633	22	7.9	7.7
Hong Kong	632	45	6.7	7.6
Japan	376	–6	6.1	4.5
Switzerland	276	76	2.4	3.3
France	167	–7	2.8	2.0
China	136	87	1.1	1.6
Germany	124	7	1.8	1.5
Australia	119	–2	1.9	1.4
Other jurisdictions	867	6	12.8	10.5

(a) The sum of jurisdiction subtotals exceeds the global total as jurisdiction subtotals are not adjusted for cross-border double counting; subtotals may not sum to total due to double counting

Sources: BIS

China's market share since 2001 has reflected progress toward internationalising the Chinese renminbi (RMB), China's financial market development, and the gradual opening up of China's capital markets to international investors (Lien and Sunner 2019). These developments may have contributed to the increase in cross-border transactions in both China and Hong Kong over the three-year period.

As turnover has become more concentrated in the large centres, smaller centres – such as Australia – have seen a continued decline in their share of activity. Australia accounted for a smaller share of global turnover in April 2019 compared with April 2016 and was the tenth largest foreign exchange market in the world, down from eighth in 2016. Similar declines in shares of global turnover were reported in France, Germany, Denmark and the Netherlands. One exception was Switzerland, whose share of global turnover increased over the period.

### Turnover by currency

Global foreign exchange turnover continues to be heavily concentrated in the currencies of major advanced economies (Table 2). Reflecting its pre-eminent role in global cross-border payments, funding and reserve portfolios, the US dollar (USD)

remained by far the most traded currency in the world; the USD has consistently been on one side of 80–90 per cent of all foreign exchange transactions for the past several decades.

While most major currencies recorded similar market share compared to previous years, the Japanese yen (JPY) saw a 5 percentage point decline in its share of total turnover. This decline was due almost entirely to lower turnover in the USD/JPY currency pair. Turnover in this pair – which accounts for nearly 80 per cent of global yen turnover – tends to increase in periods of higher financial market volatility, whereas volatility was at historically low levels at the time of the April 2019 survey. Turnover against the Turkish lira, South African rand and Brazilian real increased notably; these high-yielding currencies are attractive for Japanese retail investors, though they make up only a small share of total yen turnover.

While activity remains dominated by the reserve currencies, the share accounted for by emerging market currencies continued to rise over the three years to April 2019. Global turnover in the RMB grew strongly, although the pace of growth slowed to 41 per cent from 69 per cent three years prior, and



**Table 2: Foreign Exchange Turnover by Currency<sup>(a)</sup>**

	Global		Australia	
	Daily average US\$ billion	Share of total Per cent	Daily average US\$ billion	Share of total Per cent
<b>Total</b>	<b>6,590</b>	<b>n/a</b>	<b>119</b>	<b>n/a</b>
<b>Currency<sup>(b)</sup></b>				
USD	5,819	88.3	109	91.7
EUR	2,129	32.3	16	13.3
JPY	1,108	16.8	13	11.1
GBP	844	12.8	7	6.0
AUD	445	6.8	59	49.4
RMB <sup>(c)</sup>	284	4.3	2	1.9
Other currencies	2,552	38.7	32	26.7
<b>Currency pair</b>				
USD/EUR	1,584	24.0	12	10.0
USD/JPY	871	13.2	10	8.7
USD/GBP	630	9.6	5	4.5
USD/AUD	358	5.4	53	44.3
USD/CAD	287	4.4	2	1.7
Other currency pairs	2,860	43.4	37	30.9

(a) Subtotals may not sum to total due to rounding

(b) The sum of currency subtotals is divided by two as each transaction involves two currencies

(c) Includes onshore (CNY) and offshore (CNH) renminbi turnover

Sources: BIS; RBA

was generally in line with growth in global turnover. As a result, the RMB remained the eighth most traded currency, and its share of global turnover was largely unchanged. As noted above, the increased market activity in Mainland China over the three-year period saw the share of RMB activity accounted for in China increase (Graph 4). Around 95 per cent of renminbi turnover globally was against the US dollar.

The currencies of other Asian economies also recorded strong growth in turnover. The increase was particularly strong in the Korean won, Indonesian rupiah, Indian rupee and Hong Kong dollar. Turnover in the Hong Kong dollar more than doubled in the three years to April 2019 to become the ninth most traded currency globally, increasing from 13th in April 2016.

The Australian dollar remains the fifth most traded currency globally, and AUD/USD remains the fourth most traded currency pair. Global turnover of the

Australian dollar grew in line with global turnover (in US dollar terms) over the three years to April 2019. Most of the growth in Australian dollar turnover was recorded in offshore markets and, consistent with the global results, the United Kingdom and Hong Kong accounted for an increased share of Australian dollar turnover. Overall, 90 per cent of turnover in the Australian dollar occurred outside of Australia, having increased gradually from 60 per cent in 2001. This is broadly consistent with the trends in the share of offshore turnover in other globally traded currencies, such as the New Zealand dollar and Canadian dollar.

#### Turnover by counterparty

Large commercial and investment banks facilitate activity in the foreign exchange market by trading for their own account or to meet demand from customers. These 'reporting dealers' trade among themselves – the interdealer market – as well as

**Table 3: Foreign Exchange Turnover by Counterparty<sup>(a)</sup>**

April 2019

	Global		Australia	
	Daily average April 2019 US\$ billion	Change over 2016–2019 Per cent	Daily average April 2019 US\$ billion	Change over 2016–2019 Per cent
Reporting dealers	2,522	19	94	–3
Other financial institutions	3,595	40	21	11
<i>Non-reporting banks</i>	1,612	45	6	–21
<i>Institutional investors</i>	777	–3	11	53
<i>Hedge funds, proprietary trading firms</i>	593	52	0	–66
<i>Official sector financial institutions</i>	89	21	1	–19
<i>Other/undistributed</i>	524	175	3	82
Non-financial institutions	474	24	4	–22

(a) All amounts represent transactions between reporting dealers and each counterparty

Source: BIS

with other financial institutions and non-financial institutions. Global turnover in all three of these segments increased over the three years to April 2019 (Graph 5, Table 3).

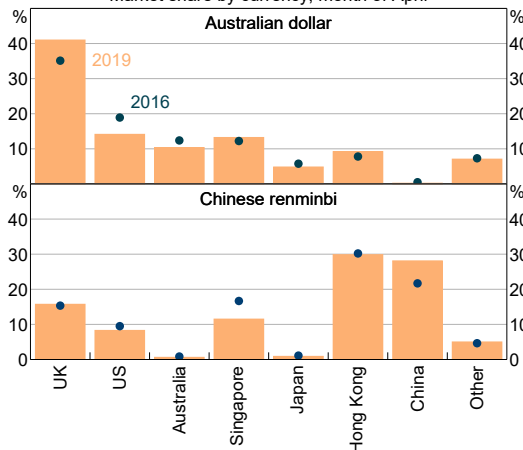
The structure of the Australian market differs markedly from the global counterparty breakdown. In Australia, the interdealer market accounts for a much larger share of activity than globally while

other financial institutions have a much smaller presence. This partly reflects the concentration of the Australian banking sector and, therefore, less activity between large dealers and smaller ‘non-reporting’ banks (who engage reporting dealers in foreign exchange transactions but do not themselves provide market-making services). It also reflects the fact that there are fewer hedge funds and proprietary trading firms (PTFs) active in Australia than in some other markets. Over the three years to April 2019, increased trading activity by institutional investors and non-financial institutions in Australia was offset by declines in other segments, including the interdealer market.

Globally, the share of turnover in the interdealer market has fallen gradually over time, from about three-quarters in 1995 to one-half in 2019. This decrease has been linked to the rise in trade internalisation, whereby reporting dealers offset trades from one customer against other customer trades in the opposite direction within a short time frame (typically a few minutes). This allows them to manage their inventory risk by squaring off positions internally rather than conducting trades with other dealers. Increased trade internalisation

**Graph 4****Geographical Distribution of Foreign Exchange Turnover**

Market share by currency, month of April



Sources: BIS; RBA

may also partly account for the reported shift in foreign exchange turnover from spot to derivatives, as spot transactions are relatively more straightforward to internalise. On a value-weighted basis, the share of turnover internalised by reporting dealers ('internalisation ratios') averaged 63 per cent in April 2019.<sup>[4]</sup>

Internalisation may also partly explain the increased concentration of the foreign exchange market over recent decades – both by institution and geographically. Larger reporting dealers with larger customer order flow can internalise trades more efficiently, and may enable these institutions to attract customers with more favourable bid-offer spreads. Further, institutions are better able to generate sufficient customer order flow to internalise trades in large and deeply liquid markets. As a result, internalisation ratios tend to be highest in larger foreign exchange trading centres. For example, the United Kingdom and United States reported internalisation ratios in excess of 75 per cent. Consistent with this, these markets have reported relatively larger declines in interdealer turnover – particularly in spot transactions – over recent surveys. Australia also recorded above-average levels of internalisation for April 2019.

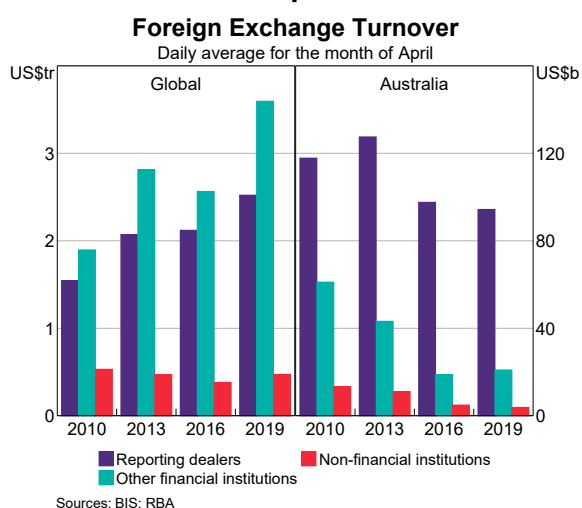
As interdealer trading has become less dominant, trading between reporting dealers and other financial institutions has grown to more than half of the global market. Growth in this segment over the three years to April 2019 more than reversed the

decline recorded in the previous survey. The increase was driven mainly by increased turnover between reporting dealers and non-reporting banks, and hedge funds and PTFs. The majority of the increase in turnover by these counterparties came from the United Kingdom where a large share of these players are located.

Increased turnover with other financial institutions coincided with a rebound in prime brokerage activity in foreign exchange markets. Prime brokers enable their clients – typically other financial institutions – to conduct trades with pre-determined third-party banks in the prime broker's name. These services are often used for more speculative activity and high-frequency execution methods. In the 2016 survey, their market activity declined sharply as banks pulled back from their prime brokerage business as they reassessed the profitability of these activities and risk associated with them (BIS 2016). Over the three years to April 2019, prime brokerage volumes grew sharply, reversing the decline reported in the previous survey.

Use of electronic execution methods continued to grow at the expense of voice methods in the three years to April 2019. However, this growth was not uniform across instruments, with electronic execution methods for outright forwards growing at a faster rate than spot transactions. Turnover executed using voice methods fell over the same period, but still accounts for over a third of global turnover.

**Graph 5**



### Turnover by instrument

Global turnover increased across all types of foreign exchange instruments over the three years to April 2019 (Graph 6). Turnover in foreign exchange swaps and outright forwards grew at a faster rate than spot transactions, continuing the longer-run increase in the share of derivatives at the expense of spot turnover. Since 1995, foreign exchange derivatives have risen from 58 per cent to 70 per cent of total global turnover.

Turnover in foreign exchange swaps increased by 34 per cent over the three years to April 2019, and contributed the most to the increase in overall

global turnover. Non-reporting banks contributed close to half of the increase in swaps over the period, consistent with swaps being used to manage funding liquidity and hedge currency risk. The majority of foreign exchange turnover was in swaps with short maturities, reflecting the fact that these instruments would need to be rolled over more frequently.

In contrast to the global results, turnover in foreign exchange swaps in the Australian market fell over the three years to April 2019, more than offsetting increases in spot and outright forwards turnover. This continued the gradual decline in the share of Australian turnover accounted for by foreign exchange swaps that began in 2013, driven mainly by declines in cross-border activity. Foreign exchange swaps accounted for 55 per cent of total turnover in Australia in April 2019, decreasing from two-thirds in April 2016. More than half of foreign exchange swaps in the domestic market involved the Australian dollar, with the majority of these being against the US dollar.

Turnover in cross-currency swaps (which differ from foreign exchange swaps as they involve interest payment streams in addition to the exchange of principal) in the Australian market increased in line with global results over the three years to April 2019. Australian financial institutions issue around two-thirds of their bonds offshore and typically use cross-currency swaps to hedge the foreign exchange exposures associated with this borrowing. However, over the three-year period Australian

banks' foreign currency-denominated bond issuance decreased slightly in US dollar terms, which highlights that these instruments are also used for other purposes.

## Single-currency Interest Rate Derivatives Turnover

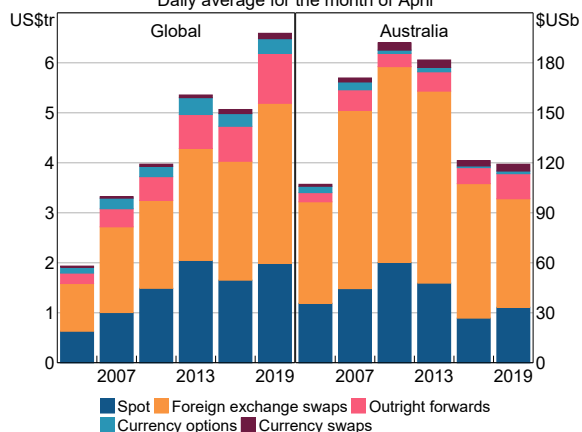
Over the three years to April 2019, average daily global turnover in single-currency OTC interest rate derivatives more than doubled to \$US6.5 trillion (Graph 7).<sup>[5]</sup> The sharp increase in turnover may have reflected several factors. Shifts in monetary policy expectations around the time of the survey were likely to have contributed to an increase in hedging and positioning activity in interest rate derivatives markets, particularly overnight index swaps (OIS). Given that these instruments are typically of short maturities, it may be the case that a driver of the increase in turnover was the need to replace these contracts more often. Another potential driver of the increase in turnover is a higher number of so-called 'compression trades' noted by reporting dealers in the 2019 survey compared with 2016. These trades look to replace a large number of existing contracts with new ones to reduce outstanding notional amounts, while keeping net exposures unchanged, but still contribute to turnover figures.

Turnover in the Australian market grew by 72 per cent in the three years to April 2019, rising by substantially less than the global results. The

**Graph 6**

### Foreign Exchange Turnover

Daily average for the month of April

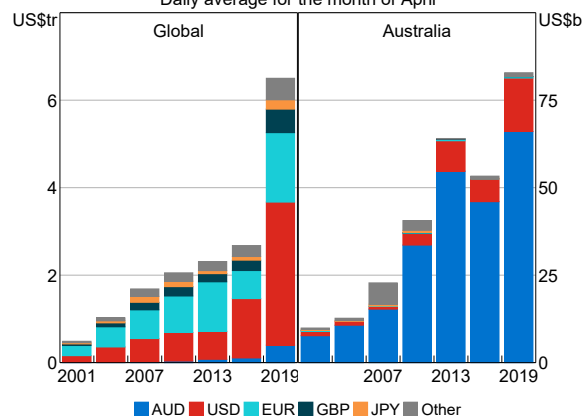


Sources: BIS; RBA

**Graph 7**

### Single-currency Interest Rate Derivatives Turnover

Daily average for the month of April



Sources: BIS; RBA

increase was driven by growth in forward rate agreements as well as cross-border activity. Turnover of New Zealand dollar-denominated instruments in the Australian market grew substantially, accounting for 15 per cent of total Australian turnover – its highest share on record.

Global turnover in Australian dollar-denominated interest rate derivatives increased at a faster pace than other major currencies. The share of global turnover accounted for by Australian dollar-denominated interest rate derivatives rose to 6 per cent in April 2019, from 4 per cent in April 2016. This increase was driven mainly by significant growth in Hong Kong, which accounted for over two-thirds of the global increase in Australian dollar-denominated turnover. This continued the gradual decrease in Australia's share of Australian dollar-denominated interest rate turnover. Interest rate swaps accounted for 97 per cent of Australian dollar-denominated turnover, compared to 83 per cent in April 2016. This increase in share was almost entirely due to a sharp decrease in the share accounted for by forward rate agreements.

In contrast, in the global results turnover in forward rate agreements and interest rate options grew at a faster rate than interest rate swaps, though interest rate swaps still account for the majority of interest rate derivatives turnover. An increase in related party trades, which captures trades between a reporting dealer's own desks, branches and subsidiaries, accounted for 24 per cent of all single-currency interest rate derivative turnover in April 2019, increasing from 15 per cent in April 2016.<sup>[6]</sup> More comprehensive reporting of these related party trades also contributed to the sharp growth in turnover between the 2016 and 2019 surveys.

The 2019 Triennial Survey for the first time distinguished between OIS and other interest rate swaps. Turnover in OIS accounted for close to half of all interest rate swap turnover globally, which corresponds to 31 per cent of global interest rate derivative turnover. Combined, turnover in OIS and forward rate agreements accounted for over 60 per cent of all turnover.

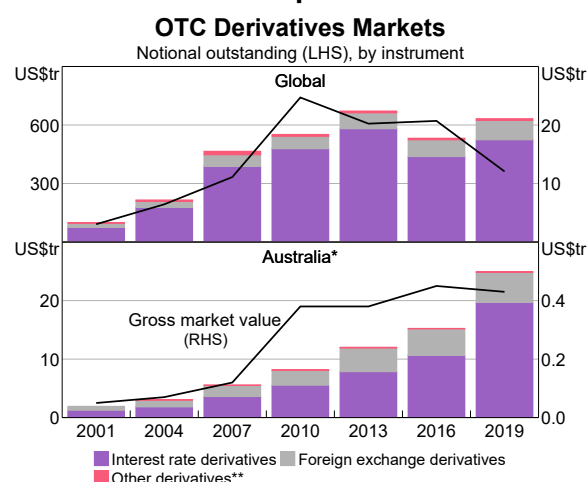
## The Size of OTC Derivatives Markets

In addition to measuring turnover, the survey provides data on the aggregate outstanding position of contracts in the OTC derivatives markets. The survey provides three measures of market size: notional amounts outstanding, gross market values, and gross credit exposures.

The notional amount outstanding refers to the face value that is used to calculate payments made on derivatives contracts. Since June 2016, the notional size of the global OTC derivatives markets increased, but remains below its 2013 peak (Graph 8). In Australia, the notional amount outstanding also increased over the past three years, following global markets. The Australian OTC derivatives market has continued to expand since the early 2000s.

The gross market value outstanding is the aggregated replacement values of outstanding contracts, evaluated at the market price. That is, it is the gross costs to which counterparties are exposed if all open contracts needed to be replaced. This measure is sensitive to changes in the instrument upon which the contract is based (e.g. interest rate or exchange rate). Therefore, it reflects both the face value (or nominal value) of derivatives as well as the extent of any fluctuations in market prices. Over recent years, the global gross market value of derivatives has declined sharply, and has halved since 2016. Factors such as trade compression (the elimination of economically redundant positions)

**Graph 8**



\* Not adjusted for interdealer double counting

\*\* Includes equity-linked, commodity and other derivatives

Sources: BIS; RBA

and new settle-to-market practices have continued to drive down global market values (BIS 2019).<sup>[7]</sup> These factors primarily affect interest rate derivatives (Financial Stability Board 2018). However, gross market value only declined slightly for Australian reporting dealers. This is consistent with earlier evidence suggesting that trade compression was less prevalent among Australian banks (RBA 2016).

These two measures of size capture overall market activity. However, as they both include the value of economically offsetting positions, these metrics do not necessarily reflect the true level of market or counterparty credit risk. These risks are better measured by the gross credit exposure, which nets the value of these offsetting positions (such as contracts covered by bilateral netting arrangements) from the gross market value. Globally, gross credit exposure has continued to fall, and is at its lowest level since the Global Financial Crisis (GFC). For Australian reporting dealers, gross credit exposure increased over the past three years. Nevertheless, gross credit exposure as a proportion of gross market value remained below long-term averages. This implies that the increase in credit exposure was likely to have been driven by the substantial expansion in the size of the Australian OTC derivatives market.

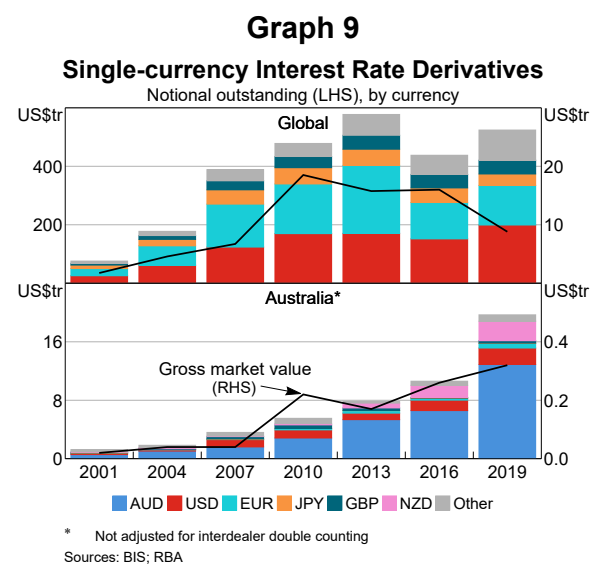
Over the previous three years, the global composition of OTC derivatives was largely unchanged. Globally, and in Australia, the majority of outstanding OTC derivatives contracts are single-currency interest rate derivatives. Australian banks had significant growth in interest rate derivatives. As a proportion of total nominal value outstanding, single-currency interest rate derivatives now account for 79 per cent of all outstanding Australian OTC derivatives contracts. This figure is up from 69 per cent in June 2016, and is now in line with the global composition of OTC derivatives. In Australia, the tenor composition of outstanding derivatives has shortened, reflecting an increasing proportion of contracts with less than 1 year to maturity.

### Single-currency interest rate OTC derivatives

The notional value of single-currency interest rate derivatives grew over the past three years. However,

the market value of these contracts has experienced a broad-based decline across most major currency denominations (Graph 9). Australian banks have had significant growth in single-currency interest rate derivatives contracts over the past three years. The notional amount increased by 85 per cent while the gross market value increased by 22 per cent. This has been largely driven by Australian dollar-denominated contracts, which account for around 70 per cent of the increase in notional values. The notional value of New Zealand dollar-denominated contracts also grew significantly. The New Zealand dollar remains the second most common currency denomination for Australian interest rate derivatives; this reflects the significant New Zealand presence of some Australian banks.

Both globally, and in Australia, central counterparties (CCP) were the most common counterparty for transactions of single-currency interest rate derivatives (Graph 10). The global volume of OTC derivatives traded between reporting dealers and CCPs was first separately identified in the 2016 survey. The rise of CCP clearing in recent years can be partly attributable to mandatory clearing, capital, and margin requirements for OTC derivatives, as well as CCP reforms (Cole and Ji 2018; Financial Stability Board 2018). The use of CCP clearing can decrease notional amount outstanding, as a number of CCPs offer trade compression services that reduce the amount of offsetting trades (RBA 2018). In Australia,





the use of CCPs has become more widespread and currently accounts for 75 per cent of the notional value of interest rate derivatives. Conversely, the proportion of contracts with other reporting dealers fell by 12 per cent in the past three years.

### Foreign exchange OTC derivatives

The notional amounts of global foreign exchange derivatives continued to increase over the past three years (Graph 11). In contrast, the global gross market value of foreign exchange derivatives decreased from 2016 levels. Developments in the Australian market followed these international patterns.

Globally, and in Australia, outright forwards and swaps remain the most common foreign exchange derivative instrument (Graph 12). The notional amount of forwards and swaps increased by 26 per cent over the three years in the Australian market, almost twice as much as the growth in the global market.

Over the past three years, the notional positions of cross-currency swaps contracted slightly, both globally and in Australia. Moreover, global cross-currency swaps have accounted for a smaller share of foreign exchange derivatives than in Australia in recent years.

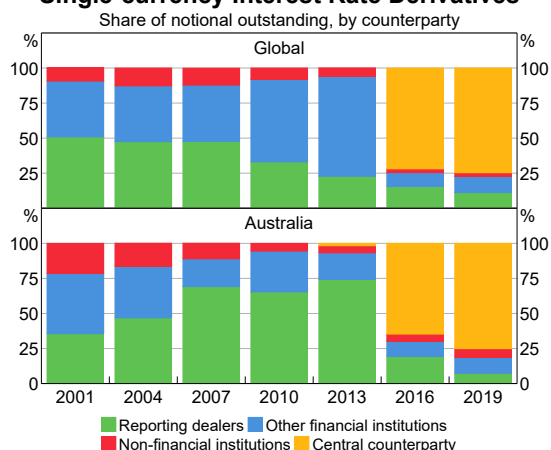
### Credit default swaps

The notional amount of credit default swaps (CDS) outstanding decreased both globally and in Australia over the past three years. This follows the long-term decline in CDS contracts outstanding (Graph 13). The fall in the Australian market was more substantial than the fall in international markets with CDS falling by around 70 per cent.

The ongoing decline in the global and Australian CDS markets may indicate continued use of trade compression to reduce offsetting positions. The decline in Australia is also partly due to the aggregation of older contracts into fewer new contracts and the reduction of CDS market activity by most reporting dealers. The counterparty distribution of the CDS market has also shifted, with CCPs and non-financial institutions becoming more

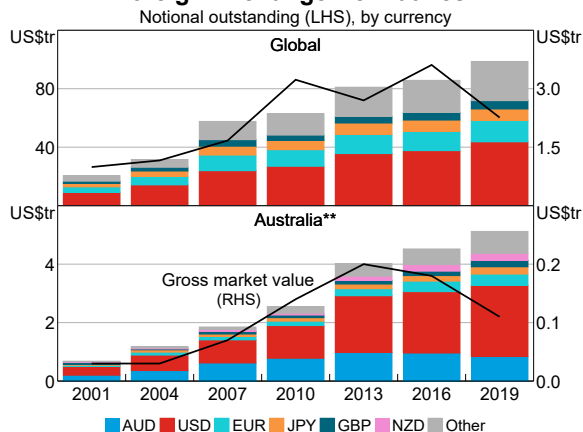
**Graph 10**

**Single-currency Interest Rate Derivatives**



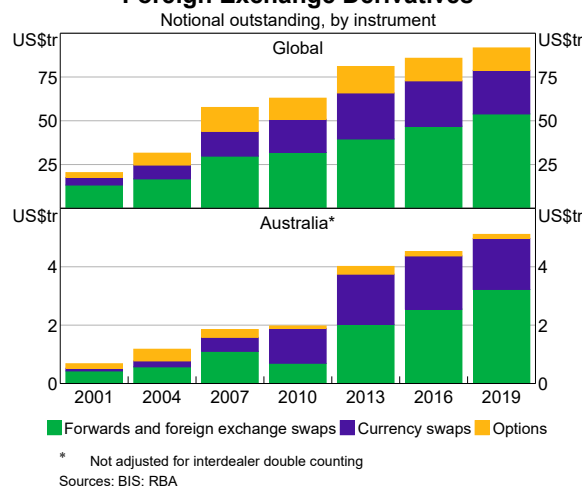
**Graph 11**

**Foreign Exchange Derivatives\***



**Graph 12**

**Foreign Exchange Derivatives**



common. In recent years, the increased presence of CCP clearing has been a key factor in reducing the market size of CDS globally (BIS 2018). However, contracts between reporting dealers remain the most common type, despite these recent declines.

Unlike the previous Triennial Survey, there were more multi-name than single-name CDS instruments outstanding in the global market. These multi-name instruments reference multiple entities, and are often indexed to a tradable basket of CDS contracts. The predominance of multi-name instruments has been a feature of the Australian market for some time.

The Australian CDS market remains more concentrated than global markets with over 40 per cent of the notional amount positions held between reporting dealers, compared with around 20 per cent for international markets. Nonetheless, both the Australian and global market concentration declined considerably relative to the June 2016 survey.

### Commodity derivatives

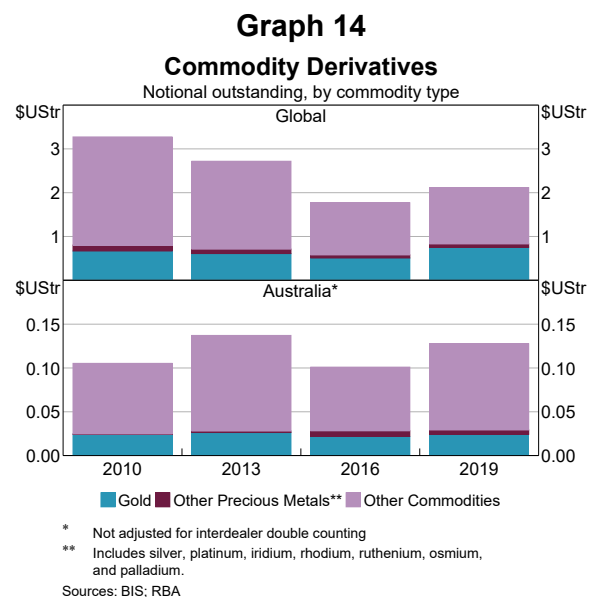
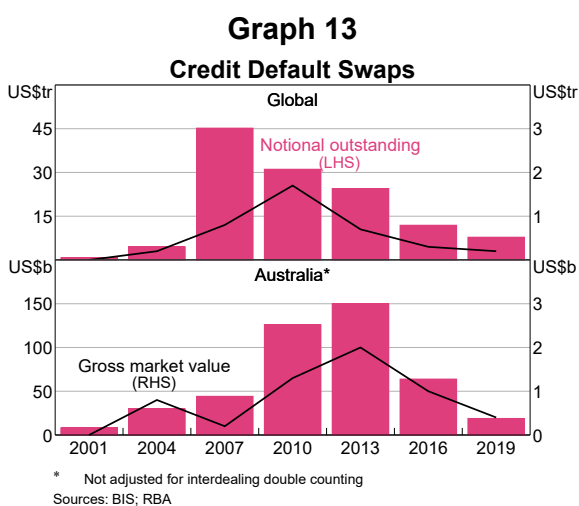
Globally, the notional value of commodity derivatives has increased since 2016 (Graph 14). Meanwhile, in Australia, the increase was more significant. The growth in commodity derivatives was mainly driven by an increase in the volume of

'other commodities' contracts.<sup>[8]</sup> Australia's share of global commodity derivatives reached its highest level in 2019; historically, it has been higher relative to Australia's share in other derivative types.

### Conclusion

Turnover in global foreign exchange markets increased in US dollar terms over the three years to April 2019. Turnover between reporting dealers and other financial institutions increased significantly, as did the share of turnover accounted for by foreign exchange derivative instruments. In contrast to global results, activity in the Australian foreign exchange market was largely unchanged: the Australian foreign exchange market was the tenth largest in the world, down from eighth in April 2016. However, the Australian dollar remained the fifth most traded currency.

The notional size of the global OTC derivatives market increased over the three years to June 2019, while the gross market value of OTC contracts fell substantially. Furthermore, the notional amounts outstanding for Australian reporting dealers grew significantly, mostly driven by the increase in interest rate derivatives. ✎



## Footnotes

- [\*] The authors are from Financial Markets Group.
- [1] The 2019 survey was undertaken in two parts. The turnover portion measured activity in foreign exchange and single-currency interest rate derivatives markets in the month of April. It was conducted by central banks and other authorities across 53 jurisdictions, and included 23 Australian reporting dealers. Data are reported based on where the transaction is arranged (sales desk basis). The outstanding portion measured the amount of OTC derivatives outstanding as at the end of June. It covered 53 jurisdictions and included responses for the consolidated operations of six large Australian banks.
- [2] Unless otherwise stated, global turnover figures are at current exchange rates and adjusted for interdealer double counting at both the local and global level. Country subtotals are adjusted for interdealer double counting at the local level only.
- [3] Semi-annual surveys are conducted by central banks and other authorities in Australia, Canada, Hong Kong, Japan, Singapore, the United Kingdom and the United States. These jurisdictions now account for around 80 per cent of the global foreign exchange market. However, the results are not directly comparable to the Triennial Survey due to some differences in the collection and attribution of turnover. Australia's results for the semi-annual survey are available on the Australian Foreign Exchange Committee website at <http://www.rba.gov.au/afxc/statistics/fx-turnover-reports/>. Quarterly data for the Australian market are also available at <http://www.rba.gov.au/statistics/tables/> (Statistical Tables F9 and F10).
- [4] Changes in reporting guidelines regarding internalisation ratios mean that these figures are not directly comparably between the 2016 and 2019 surveys
- [5] Single-currency OTC interest rate derivatives include forward rate agreements, swaps and options.
- [6] Part of this increase can be attributed to more comprehensive reporting of related party trades in the April 2019 survey than in previous surveys.
- [7] Settle-to-market practices refers to when financial institutions make outright payments (rather than posting additional collateral) against changes in market value, thereby restoring market values to zero.
- [8] The BIS does not provide a further breakdown of the 'other commodities' category. Other commodities include all commodities other than gold and other precious metals.

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