Bulletin

JUNE 2021

RESERVE BANK OF AUSTRALIA

Bulletin

JUNE 2021

Contents

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COVID-19 Stimulus Payments and the Reserve Bank's Transactional Banking Services

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Photo: Peeradon Warithkorasuth – Getty Images

Abstract

The Australian Government introduced significant fiscal support measures to limit the negative economic effects of the COVID-19 pandemic and support economic recovery. In its capacity as the banker to the Commonwealth of Australia, and importantly as transactional banker to the large agencies charged with delivering a number of these measures, the Reserve Bank facilitated the distribution of fiscal stimulus payments to households and businesses. Improvements in government processes to ensure bank account details are available when delivering large-scale economic stimulus programs ensured that the COVID-19 stimulus payments were delivered more quickly and efficiently when compared to the stimulus payments made during the Global Financial Crisis (GFC) in 2008 and 2009. This meant that there was little delay for the economic stimulus to be available to the recipients and the economic support to take effect.

COVID-19 caused an unprecedented economic shock and the Australian Government responded with a stimulus package

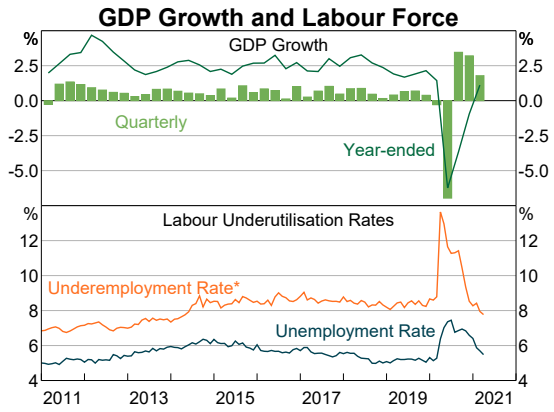
While the COVID-19 pandemic primarily had profound public health implications, it also caused a major economic contraction (Graph 1). Substantial fiscal and monetary policy support measures were introduced from early 2020 onwards, initially to limit the negative economic effects on households and businesses and then more recently to support economic recovery. For its part, the Australian Government responded quickly with the largest fiscal support during peacetime, which was worth 7 per cent of GDP in 2020/21 (Graph 2).[1] Among

other things, the fiscal measures included significant fiscal stimulus payments to households and businesses, including JobKeeper, Economic Support Payments (ESP) and the Coronavirus Supplement. Another aspect of the Reserve Bank of Australia's (the Bank's) role during the pandemic was in facilitating the disbursement of these payments.

As the banker to the Commonwealth of Australia, the Bank provides a range of banking and payment services to meet the needs of the Australian Government. This includes transactional banking services to more than 90 government agencies, including Services Australia and the Australian Taxation Office (ATO). The many services offered by the Bank include the distribution of electronic payments, which are processed in bulk and directly credited to recipients' bank accounts. The Bank assists in the reliable delivery of fiscal support measures by ensuring payments can be provided directly to a large number of financial institutions in a timely way, especially during extraordinary times. The Bank has established more direct connections to financial institutions than is standard industry practice because of its involvement in the delivery of large-scale payment programs from time to time.

This article describes how the Bank supported the Australian Government and its agencies in disbursing COVID-19 stimulus payments, draws comparison to the stimulus payments delivered during the Global Financial Crisis (GFC), and discusses factors that enable the Reserve Bank to be a reliable banker to its government customers.

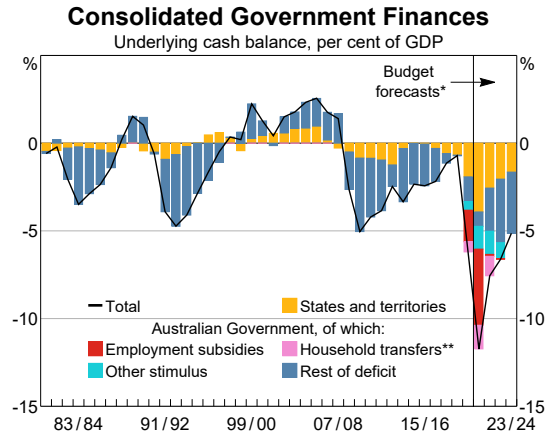
Graph 1



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

Source: ABS

Graph 2



* Forecasts from latest budgets or budget updates

** Includes household income tax changes from 2020/21 and 2021/22 budgets

Sources: ABS; Australian Treasury; RBA; state and territory budgets

The Bank promptly delivered COVID-19 stimulus payments to affected individuals and businesses

In 2020, the Reserve Bank processed more than 355 million payments on behalf of its government customers, almost all of them electronically transferred for direct crediting of the recipients' bank accounts. Generally, the number of payments made by cheques has declined markedly over recent years, while the use of real-time payments using the New Payments Platform (NPP) gradually increased since the NPP's introduction in 2018. (Graph 3) Overall, payment volumes and values processed by the Bank increased in 2020 due to the government's COVID-19 stimulus payments. (Graph 4)

Of the government's range of stimulus payments, the ESP (about $12 billion), the Coronavirus Supplement (estimated $20 billion), and the JobKeeper program (about $90 billion) were the largest processed by the Bank.[2] Services Australia administered the ESP and the Coronavirus Supplement. There were 4 rounds of ESPs with one-off payments made to eligible recipients of social assistance payments. The Coronavirus Supplement was an increase (or top-up) to the existing JobSeeker payments, made to those on eligible income support on a fortnightly basis. The ATO's JobKeeper program supported employers and sole traders that were significantly affected by COVID-19 by subsidising part of their employees' wages.

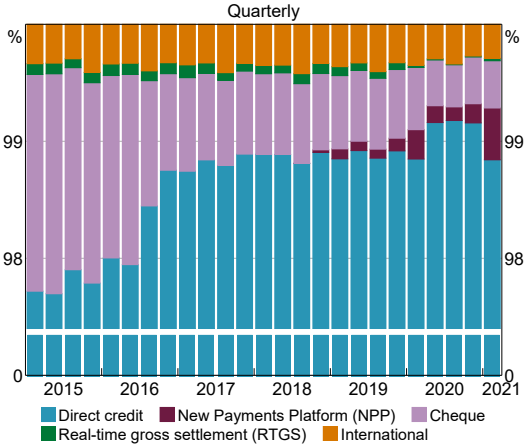
These large-scale programs to support households and businesses were announced in quick succession in March 2020 and implemented shortly thereafter (Figure 1). On 31 March 2020, 2 weeks after the first announcement of the first round of the ESP, the Bank began receiving bulk payment files for processing and disbursement to recipients' financial institutions. In April and May 2020, the Bank commenced the distribution of the fortnightly Coronavirus Supplement payments and the fortnightly JobKeeper payments to businesses.

As the ESP and the Coronavirus Supplement payments were processed alongside recipients' usual benefit payments from Services Australia, payment values processed by the Bank significantly increased and payment volumes spiked on key dates for social assistance payments (Graph 5 and Graph 6). During the week in which the Bank commenced distributing the first round of the ESP, almost 9 million payments were delivered worth more than $12 billion. The second round of the ESP coincided with the JobKeeper and the Coronavirus Supplement payments, which resulted in the highest number of payments the Bank processed in a single day, consisting of 4.3 million payments totalling $4.6 billion.

Graph 3

Share of Payment Volume

Quarterly

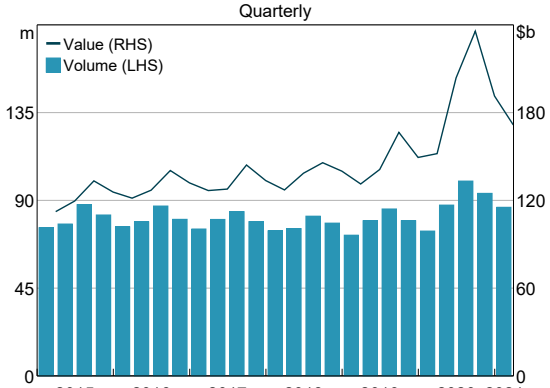


Source: RBA

Graph 4

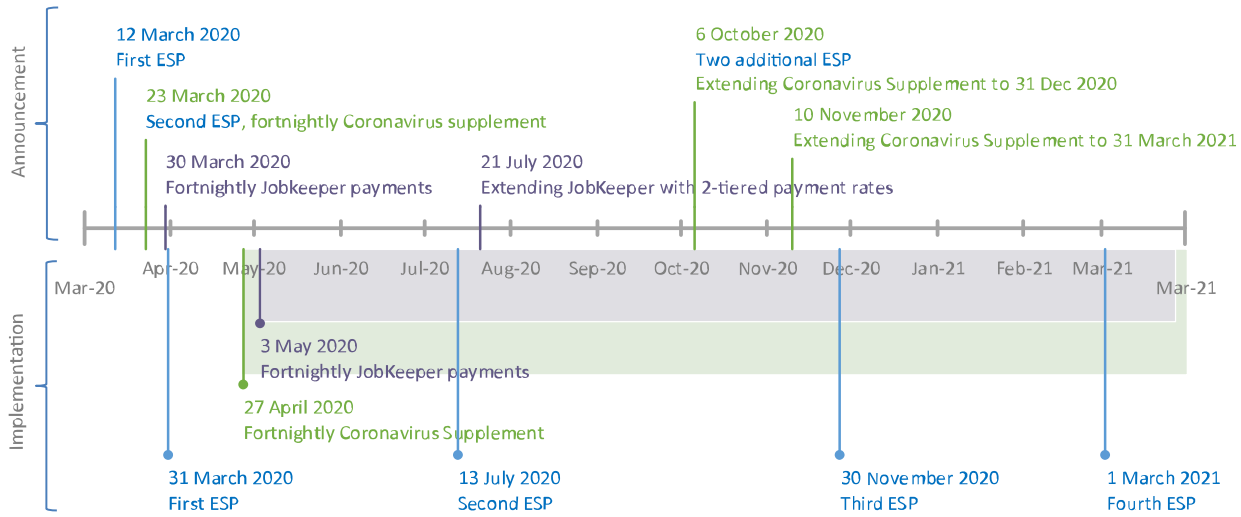
Total Payments

Quarterly



Source: RBA

Figure 1: Timeline of Economic Support Payments



Source: Australian Taxation Office, Commonwealth of Australia, RBA and the Treasury

The Bank was able to deliver these stimulus payments reliably and swiftly, despite the daily payment volumes reaching record levels, with significant peaks in the volume of transactions. The key enablers that allowed seamless disbursement of stimulus payments included prior investments in building a robust foundation of information technology systems such as the new core banking system and the proprietary Government Direct Entry Services (GDES) system. GDES is used to make direct credit payments in bulk and is a well-established, robust system, ensuring payments are received by 9 am on the payment date. The Bank's systems and processes are regularly tested for their performance under varying circumstances. This allowed for the delivery of the high volume of payments without requiring any process changes, despite the shift to working from home.

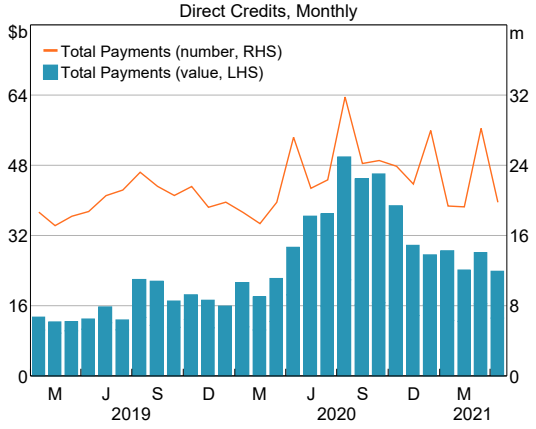
A heightened level of collaboration between government agency customers, internal and external stakeholders was essential to the successful distribution of the largest stimulus payment programs. Due to the accelerated delivery of these large volumes of stimulus payments, close coordination was needed between the Bank and the government agencies as well as the payments industry. The government agencies are responsible for determining the eligible recipients and payment values and generating bulk payment files, which are securely transferred to the Bank. Upon receipt, the Bank validates the information, ensuring the payments can be made reliably, and distributes the payment instructions to the recipients' banks. Once the payment instructions have been successfully sent to the receiving bank, the funds are required to be credited to the recipients' bank accounts by 9 am on the payment date. Because of the high volumes and values involved, the Bank coordinated these payment processes carefully with the government agencies as well as the commercial banks.

During times where large numbers of welfare payments are made, liaison and coordination with the financial institutions in Australia is vital so that there is sufficient cash available in their ATM networks to meet the additional cash demand from welfare recipients. To enable readiness for large payment days during the COVID-19 stimulus programs, the Bank advised the financial institutions of the stimulus payment values being disbursed in advance. This was particularly important as the pandemic led to a sudden and strong demand for cash and the commercial banks' currency holdings were quickly run down. This was coupled with fewer banknote deposits flowing into the banking sector (Guttmann *et al* 2021).

Graph 5

Government Payments to Households*

Direct Credits, Monthly



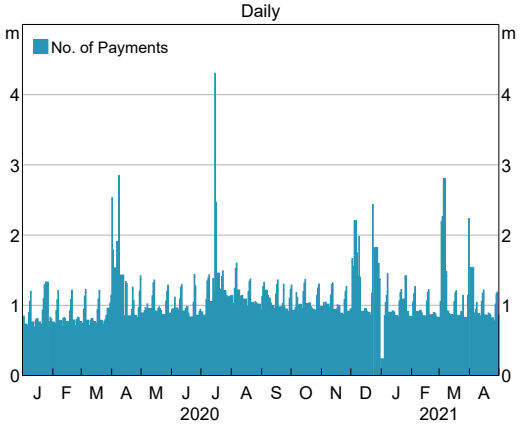
* Payments processed by the Reserve Bank for Services Australia welfare programs including Economic Support Payments, Coronavirus Supplement and ATO tax payments including JobKeeper

Source: RBA

Graph 6

Number of Direct Credit Payments*

Daily



* Payments processed by the Reserve Bank for Services Australia welfare programs including Economic Support Payments, Coronavirus Supplement and ATO tax payments including JobKeeper

Source: RBA

The COVID-19 stimulus was different to the GFC stimulus payments

In 2008 and 2009, the Australia Government also provided fiscal stimulus payments to the national economy during the GFC. Although there are similarities between the COVID-19 stimulus

Table 1: Key Differences of the GFC and COVID-19 Stimulus Payments

COVID-19 stimulus	GFC stimulus
Size of the stimulus payments disbursed by the RBA	
> $120 billion for ESP, Coronavirus Supplement, and JobKeeper	$20 billion
Range of recipients	
• ESP: between 5 and 6.6 million households and individuals • Coronavirus Supplement: about 2.2 million individuals received fortnightly JobSeeker top-ups • JobKeeper: more than 1 million businesses received the fortnightly wage subsidy, supporting 3.6 million individuals	• More than 5 million households and individuals received welfare payments • 8.4 million tax payers received a tax bonus
Payment methods	
28.5 million electronic, direct credit transfers for ESP and JobKeeper payment plus regular welfare payments including the Coronavirus Supplement	16.7 million payments: • 12.4 million electronic transfers • 4.3 million cheques
Operational efficiency	
Exclusive use of electronic, direct credit transfers (processed in bulk) enabled swift availability of funds to recipients. In the main, the delivery was as part of normal business operations.	The use of cheque issuance required more preparation to be operationally ready. Availability of funds to recipients lagged issuance by 9 days on average.

payments and the GFC stimulus payments, there are stark differences regarding the size and the range of recipients for each. Further, only electronic payment methods were used during the delivery of the more recent stimulus payments, which considerably improved operational efficiency (Table 1).

The COVID-19 stimulus value disbursed by the Bank was much larger than during the GFC

As the size of the economic shock differed, so did the sizes of the stimulus programs. During the GFC, the Bank assisted the Australian Government by disbursing almost 16.7 million payments totalling $20 billion. The overall COVID-19 stimulus payments disbursed by the RBA are estimated to have been worth about $120 billion – about 6 times the value of the GFC stimulus payments processed by the Bank in 2008 and 2009.

In terms of the peak volume of payments, on 15 July 2020, the Bank processed a record-breaking number of transactions comprising 4.3 million payments. This single day's volume was equivalent to a quarter of the total number of stimulus payments processed by the Bank during the entire 2008/2009 GFC period and equivalent to the number of cheques issued over a 5-week period.

The range of recipients was broader during COVID-19

Stimulus payments to households during the GFC consisted of 2 rounds of Services Australia payments to low-income households (5.5 million payments worth $8.7 billion and 2.8 million worth $5 billion respectively), and 8.4 million bonus payments from the ATO worth around $7.3 billion. The ATO provided one-off payments worth $950 made to every Australian taxpayer who earned less than $80,000 during the 2007/08 financial year (Reserve Bank of Australia 2009).

During the COVID-19 pandemic, the government issued ESP and Coronavirus Supplement payments to households and individuals. While JobKeeper payments were made directly to employers and sole traders, they aided both businesses and households through support to incomes and job retention. For the 4 rounds of ESPs, it is estimated that there were between 5 and 6.6 million recipients

for each round of payments with an estimated total value of approximately $12 billion (Commonwealth of Australia 2020). The fortnightly Coronavirus Supplement was estimated to be worth around $20 billion and was provided to 2.2 million income support recipients as part of the regular welfare payments (Prime Minister of Australia 2020) (Commonwealth of Australia 2020). The JobKeeper program supported up to 3.6 million individuals in over 1 million businesses at the height of the program and is estimated to have cost $90 billion (Treasurer of the Commonwealth of Australia 2020) (Commonwealth of Australia 2021).

The payments were delivered differently

Another important difference was in the composition of payment methods used to dispense the stimulus packages. The distribution of payments during the GFC was completed by issuing a relatively large number of cheques. The ATO issued the 'tax bonus' payments to eligible tax payers. However, not all the intended recipients had provided the ATO with their bank account information, making direct crediting arrangements not possible for a large number of eligible recipients. As a result, the ATO issued 4.3 million cheques over a 5-week period and the Bank prepared for their presentment at a future time by estimating the daily number of cheque presentments against the expected issuance profile. In comparison, 3.7 million direct credit transfers were made to recipients for whom bank account information was available to the ATO.

Over the past decade there has been a distinct trend away from cheque usage in government payments (Graph 3). This has enabled funds to be made available to recipients more quickly, presenting greater efficiencies for the government and the Bank. In 2020, the ATO was able to collect bank account information from businesses registered for JobKeeper, which enabled the exclusive use of electronic, direct credit transfers. Because stimulus payments were distributed electronically, this meant faster, secure and more cost-effective delivery of the stimulus payments. Importantly, the recipients received funds in their bank accounts by 9 am on the payment date.

Operational processes were much more efficient

Due to the extensive use of cheques during the GFC stimulus, the ATO, the Bank and broader industry had to ensure that there was a high degree of preparedness in order to handle the large volume of cheques being issued, printed, posted, presented and cleared. Specific operational arrangements had to be made across the industry to ensure that retail banks were prepared for the higher branch attendance of customers who were presenting their cheques. Special consideration also had to be given to the management of adequate cash supplies.

This created a considerable lead time between the policy decision to make stimulus payments and money arriving in recipients' bank accounts. The Bank had to ensure relevant banking systems were able to process such a large volume of cheques including the Bank's cheque fraud detection systems. Between April and June 2009, the Bank processed 7.9 million cheques,[3] which was more than twice the amount processed over the same period in the previous year (3.6 million). Further, recipients had to wait until they received cheques in the mail and subsequently deposit the cheque at their local bank branch before being able to access the funds. On average, clearing of cheques took 9 days from issuance.

Because the timing of cheque clearances was not certain, the required amount in the government's core bank account on any given day had to be estimated. At that time, this required the Bank to estimate daily cheque presentment volumes based on the observed presentment behaviours over previous years. This information was then provided to the Australian Office of Financial Management (AOFM) to ensure sufficient funds were available in the government's core account at the Bank. For the COVID-19 stimulus package, the ability to exclusively use direct credit transfers and settle payments into the recipients' bank accounts on the payment date meant that the government knew the required funding amount in advance.

The government's quick action to announce and implement the COVID-19 stimulus combined with the fast delivery method meant that there was little delay for the economic stimulus to be available to

the recipients and the economic support to take effect. As estimated by the Reserve Bank, the JobKeeper program for example saved approximately 700,000 jobs (Bishop and Day 2020). Being able to efficiently and reliably distribute payments for the government improved the effectiveness of the government programs, which was vital during the COVID-19 pandemic and motivates the Bank to continually innovate and invest in its capabilities.

The Bank has made significant investments to support the efficiency of government payments

The nature of the transactional banking services offered by the Bank is continuously evolving, driven by changes in payments technology and government processes. The Bank seeks to involve its government customers in the latest developments in payments technology so that government agencies can meet the growing expectations of the community regarding reliability and the speed of payments. This approach has proved to be more important for the delivery of services during times with heightened needs such as natural disasters or the COVID-19 pandemic.

To support its transactional banking operations, the Bank recently completed a significant program of work to upgrade its banking systems. The project involved replacing the account maintenance system, as well as systems used to process government payments and receipts, and adopted a more modern programming language and architecture. This program, completed in August 2019, provides the Bank with a modernised platform that proved to be resilient, and effective in processing high volumes of government payments during COVID-19 .

The Bank has also recently invested in its capability to use the NPP. The Department of Finance uses the NPP to fund government agencies in real time on a 24/7 basis. This ensures that funds are available to government agencies at short notice, for example in response to emergencies such as floods, bushfires or for the procurement of medical supplies during the COVID-19 pandemic. Correspondingly, the implementation by Services Australia of NPP payment capability in October 2018 enabled the government to make bushfire relief payments to affected individuals and households in real time, including on weekends, public holidays and after hours. This means that people affected by hardship can receive funding from the government without delay and irrespective of the day and time (Leung 2020).

One of the Bank's key objectives regarding its transactional banking services is to further develop NPP capabilities and to take further advantage of the NPP's superior functionalities such as the ability to include more information in the payment details,[4] the ability to make payments on a 24/7 basis as well as the real-time settlement of the funds. The future vision for government payments is to utilise the NPP and deliver more payments in real time and irrespective of the day and time; whether they are for stimulus or emergency programs, or for regular payments.

The next innovation priority for the Bank is to build on the NPP's foundational capability by adopting a new payment mandate service, known as PayTo. PayTo is a new efficient way for people to pre-authorise real-time payments from bank accounts, providing full visibility to the payer and receiver, addressing some of the shortcomings of the current direct debiting processes (NPPA 2020).

Conclusion

The COVID-19 pandemic had major health and economic implications globally and in Australia. This led to the largest and most rapid economic response from the Australian Government in Australia's history. The Bank was able to assist the Australian Government in supporting Australian households and businesses by utilising improved transactional banking capability to rapidly disburse record levels of economic support. The Bank will continue to enhance and improve on existing payment infrastructures to ensure government payments are processed efficiently, securely and immediately when needed, supporting Australians as fast and reliably as possible when required. The delivery of the recent stimulus programs – when compared to the GFC's – highlights the efficiencies of electronic payment processes and how much

more quickly stimulus can be delivered where the government has accurate up-to-date bank account information. In the future, the Bank will continue to work with its government customers to further enhance the delivery of payments moving to more payments cleared and settled in real time and on a 24/7 basis, further enabling the Australian Government to swiftly and effectively implement support programs during extraordinary times.

Footnotes

[*] The authors are from Banking Department and thank Suzanna McDonald, Jared Griffiths, Kate McLoughlin and Rochelle Guttmann for their valuable assistance and contributions.

[1] For a summary of the Reserve Bank's response to the pandemic, see: Supporting the Economy and Financial System in Response to COVID-19 | RBA.

[2] The data sources for this article are a combination of transactional data monitored and estimated by the Reserve Bank, based on the base amounts transferred, as well as official government sources. Because some stimulus payments are paid as supplements to regular welfare payments, the exact numbers and amounts are not discernible and the Bank refers to official data published by the government.

[3] This included 4.3 million cheques processed for the ATO's tax bonus as well as the ordinary cheque volume processed by the Bank during that time.

[4] A payment via the NPP can include up to 280 characters of unstructured remittance information. In comparison, a direct credit transfer allows for a maximum of 18 characters, limiting the ability of the sender to include a useful payment description.

References

Australian Taxation Office (2021), 'JobKeeper key dates', 24 March. Available at <https://www.ato.gov.au/general/jobkeeper-payment/jobkeeper-key-dates/>.

Bishop J and I Day (2020), 'How Many Jobs Did JobKeeper Keep?', RBA Research Discussion Paper No 2020-07.

Commonwealth of Australia (2020), 'Budget Measures - Budget Paper No. 2 2020-21' *Budget 2020-21*, 6 October. Available at <https://budget.gov.au/2020-21/content/bp2/download/bp2_complete.pdf>.

Commonwealth of Australia (2020), 'Budget Strategy and Outlook - Budget Paper No. 1 2020-21' *Budget 2020-21*, 6 October. Available at <https://budget.gov.au/2020-21/content/bp1/download/bp1_w.pdf>.

Commonwealth of Australia (2020), 'Economic and Fiscal Update', July. Available at <https://budget.gov.au/2020-21/content/jefu/downloads/JEFU2020.pdf>.

Commonwealth of Australia (2020), 'Mid-Year Economic and Fiscal Outlook 2020-21', December. Available at <https://budget.gov.au/2020-21/content/myefo/download/myefo-2020-21.pdf>.

Commonwealth of Australia (2021), 'Budget Strategy and Outlook - Budget Paper No. 1 2021-22' *Budget 2021-22*, 11 May. Available at <https://budget.gov.au/2021-22/content/bp1/download/bp1_2021-22.pdf>.

Guttmann R, C Pavlik, B Ung and G Wang (2021), 'Cash Demand during COVID-19', RBA *Bulletin*, March, viewed 10 March. Available at <https://www.rba.gov.au/publications/bulletin/2021/mar/cash-demand-during-covid-19.html>.

Leung T (2020), 'Transactional Banking at the RBA in Extraordinary Times', RBA *Bulletin*, June, viewed 10 March. Available at <https://www.rba.gov.au/publications/bulletin/jun/2020/transactional-banking-at-the-rba-in-extraordinary-times.html>.

NPPA (2020), 'Government agencies funded in real-time via the NPP', New Payments Platform site, 3 July. Available at <https://nppa.com.au/government-agencies-funded-in-real-time-via-the-npp/>.

NPPA (2020), 'Mandated Payments Service', New Payments Platform site, 30 April. Available at <https://nppa.com.au/wp-content/uploads/2020/11/NPP-Mandated-Payments-Service-Overview_final-Apr-2020.pdf>.

Prime Minister of Australia (2020), 'JobSeeker Supplement Extended to March', 10 November. Available at <https://www.pm.gov.au/media/jobseeker-supplement-extended-march>.

Reserve Bank of Australia (2009), 'The RBA's Role in Processing the Fiscal Stimulus Payments', *Bulletin*, August.

The Treasury (2020), 'JobKeeper Extension', 15 October. Available at <https://treasury.gov.au/coronavirus/jobkeeper/extension>.

The Treasury (2020), 'Payments to support households' *COVID-19 Economic Response*, 15 October. Available at <https://treasury.gov.au/sites/default/files/2020-10/Fact_sheet-Payments_to_support_households_1.pdf>.

Treasurer of the Commonwealth of Australia (2020), 'Rebuilding and reforming in a year like no other', 28 December. Available at <https://ministers.treasury.gov.au/ministers/josh-frydenberg-2018/media-releases/rebuilding-and-reforming-year-no-other>.

How Far Do Australians Need to Travel to Access Cash?

James Caddy and Zhan Zhang[*]

Photo: Glow Images – Getty Images

Abstract

Our analysis finds that Australians generally do not have to travel far to reach their nearest cash access point – a location where they may make cash withdrawals and/or deposits. Around 95 per cent of people live within about 5 kilometres of a cash access point, broadly unchanged since 2017. However, there are parts of regional and remote Australia with limited access to cash. People in these areas must travel longer distances to access cash, and the available access points do not always have nearby alternatives. This means that access to cash in these areas is more vulnerable to any future removal of cash services.

Introduction

Cash use in Australia has been declining for some time. The Reserve Bank of Australia's (RBA's) Consumer Payments Survey (CPS) showed that cash accounted for 27 per cent of payments in 2019, down from 69 per cent in 2007 (Graph 1, LHS).[1] The number of cash withdrawals in Australia has also fallen over this period; for example, the number of ATM withdrawals has halved from over 70 million withdrawals per month in the early 2010s to around 35 million in recent months (Graph 1, RHS). Coming on top of the long-run decline, the COVID-19 pandemic has resulted in a further downward shift in cash use and withdrawals (Guttmann *et al* 2021).

At the same time, cash remains an important payment method in Australia. Cash is a default fee-free payment option for people to use in stores, as card transactions are sometimes surcharged. In addition, some businesses and consumers rely heavily on cash to make or receive payments. For example, 15 per cent of respondents in the 2019 CPS used cash for 80 per cent or more of their payments; these high cash users were more likely to be older Australians living in regional areas and less likely to have access to the internet (Delaney,

McClure and Finlay 2020). Around a quarter of respondents also indicated that they would suffer major inconvenience or genuine hardship if cash could no longer be used as a method of payment. Another reason why cash remains an important payment method is that it is a backup option during outages in electronic payment systems.

For cash to be able to be widely used, Australians must be able to easily withdraw and deposit it. The Reserve Bank of Australia (RBA 2021a), as part of its 2020/21 Corporate Plan, has committed to work to support the ongoing provision of cash services in Australia. This article contributes to this goal by examining Australians' distance to cash access points.

We first define a cash access point, then measure the population's distance to these points. We then identify gaps in cash access points and consider the robustness of access to any further rationalisation in cash services.

Cash access points

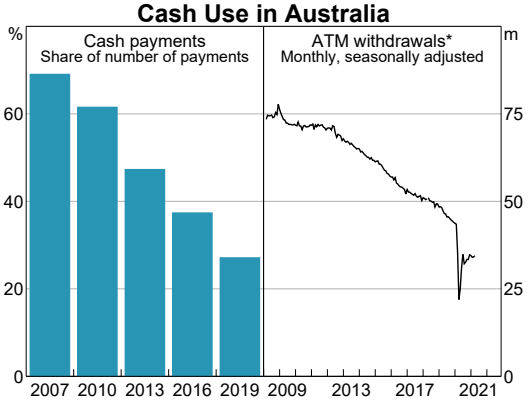
There are several types of cash services, or cash access points, available to Australians:

- ATMs, which are widely used across the community to withdraw cash (some also accept deposits)
- bank branches, which allow customers of that bank to withdraw and deposit cash
- Australia Post's Bank@Post outlets, which offer cash withdrawals and deposits for customers of more than 80 authorised deposit-taking institutions (ADIs), including 3 major banks; these outlets are considered as ADI access points for the remainder of this note.

Outside of these 'formal' cash access points, Australians can also obtain cash at the point of sale (i.e. eftpos cash-out, which is offered by some merchants), or by receiving payments and gifts in cash. These are beyond the scope of this article.

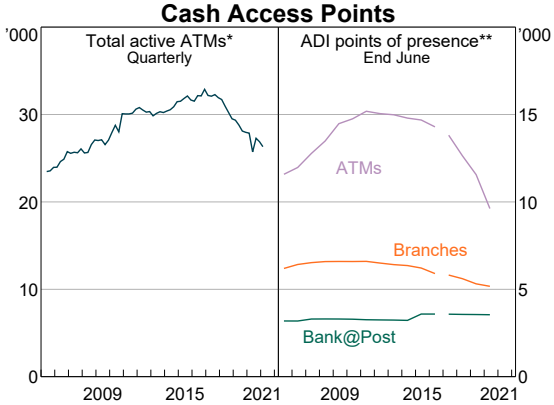
The number of cash access locations has been decreasing in Australia alongside the reduction in cash use and withdrawals. The total number of active ATMs across all deployers has fallen by around 20 per cent (or 6,500 machines) since its peak in late 2016 (Graph 2, LHS). The decline in ATMs owned by banks has been greater than that of independent deployers over this period. This reflects industry efforts to improve efficiency and the recent decisions by some banks to sell parts or all of their off-branch ATM fleets to independent deployers. The network of full-service bank branches also declined by around 20 per cent (or 1,400 branches) over the decade to mid 2020 (the latest available official data; Graph 2, RHS). Banks have continued to close branches since this time; parliamentary testimonies from the 4 major banks indicate more than 220 branches have been closed or are due to close (on net) since then (see Parliament of Australia Standing Committee on Economics (2021)), and there have been significant branch closures announced by some smaller banks.

Graph 1
Cash Use in Australia



* Series break in May 2018 due to changes in reporting methodology
Sources: Colmar Brunton; Ipsos; RBA; Roy Morgan Research

Graph 2
Cash Access Points



* The decrease in the number of active ATMs in June 2020 was largely due to temporary COVID-19-related venue closures
** Series break in June 2017 due to APRA data collection change
Sources: APRA; AusPayNet; RBA

Despite the decline in the aggregate quantity of cash access points in Australia over recent years, around 90 per cent of 2019 CPS respondents still indicated that access to cash withdrawal services was 'convenient' or 'very convenient' (with access to cash deposit services somewhat less convenient) (Caddy, Delaney and Fisher 2020). This may be because the removal of cash access points has typically been concentrated in metropolitan regions where there are multiple nearby alternatives – for example, the removal of some ATMs co-located at shopping centres. Understanding the location, as well as the number, of cash service points is therefore important to evaluating Australians' access to cash. A number of other factors are also relevant to cash access, but these are largely beyond the scope of this article. For example, all cash points are not equivalent: bank branches typically only service customers of that bank; not all banks subscribe to the Bank@Post service and so customers of some banks cannot use these facilities; and some people may require 'face-to-face' branch services and are therefore not well served by ATMs. Fees for cash withdrawals and deposits (for example, ATM withdrawal fees) may also impact people's access to cash.

To assess the geographic distribution of access to cash withdrawal and deposit services, we draw upon and update the method used in Delaney, Finlay and O'Hara (2019). Specifically, we use the following data:

- the ADIs' Points of Presence publication by the Australian Prudential Regulation Authority (APRA), which provides the location of all ATMs and branches of ADIs (i.e. banks, credit unions and building societies), as well as all Australia Post Bank@Post outlets and other face-to-face ADI points (which may not offer all the services available at full-service branches), as of June 2020
- ATM data sourced directly from a number of independent ATM deployers. The data include the location of ATMs operated by Banktech, Next Payments, Linfox Armaguard, and Prosegur. These data include roughly 6,800 ATMs, equivalent to around 40 per cent of all independently deployed ATMs. This means that we likely somewhat underestimate access to cash as the other machines doubtless expand the geographic footprint of access points
- fee-free ATMs set up in remote Indigenous communities. Under this program, participating commercial banks pay independent deployers to provide fee-free ATMs in remote parts of the Northern Territory, Queensland, Western Australia, and South Australia (Australian Banking Association 2017)
- the Australian Bureau of Statistics' (ABS') Australia Population Grid 2019, which presents Australia's 2019 population in one square kilometre grids.

The data include access points that were temporarily closed during COVID-19-related lockdowns but does not incorporate changes in cash access points occurring since June 2020.

How far are Australians from cash withdrawal and deposit services?

Our analysis indicates that most Australians live relatively close to cash services (Table 1). As of June 2020, 95 per cent of Australians lived within 4.3 kilometres of an identified cash withdrawal point (which includes ATMs, branches, and Bank@Post outlets), and 5.5 kilometres of a cash deposit point; here and elsewhere, distances are measured as the shortest distance between 2 points (i.e. as the crow flies).

The geographic accessibility of these services was generally little changed in the 3 years to June 2020, despite the reduction in the aggregate number of access points (Table 1). For example, in 2017, 95 per cent of the population lived 8.9 kilometres from an ADI withdrawal ATM, whereas in 2020 that distance increased to 9.3 kilometres. Access to ADI branches changed more noticeably than for other services, with the average distance to an ADI branch for 95 per cent of the population increasing by 0.8 kilometres since 2017.

The distance Australians have to travel to access cash differed significantly across service types. In particular, Bank@Post outlets, where both cash withdrawals and deposits can be made, continued to maintain higher geographic coverage:

Table 1: Distance to Cash Services

	June 2020			Change from June 2017[a]	
	Number	Distance in kilometres[b]		Number	Distance in kilometres[b]	
		95 per cent	99 per cent		95 per cent	99 per cent
ADI deposit[c]	9,363	5.5	16.7	−1,122	0.1	−0.3
ADI branches[d]	5,816	10.0	30.1	−1,091	0.8	2.1
Bank@Post outlets	3,547	5.7	17.4	−31	−0.1	−0.7
ADI withdrawal[e]	18,984	4.9	16.3	−5,316	0.1	−0.2
ADI ATMs	9,621	9.3	34.2	−4,194	0.4	−0.5
All identified withdrawal[e]	25,767	4.3	14.8			
All identified ATMs	6,783	6.5	24.6			

(a) The changes in distance account for movements in population. That is, the distances are calculated using population data at different points in time.

(b) Distance within which 95 per cent and 99 per cent of Australia's usual resident population lives.

(c) Deposit locations are ADI branches and Bank@Post outlets. While some ATMs allow cash deposits, these are generally located at bank branches.

(d) ADI branches includes 'other face-to-face' outlets but excludes Citibank branches, which are cash-free. Other branches may also be cash-free.

(e) Withdrawal locations are ATMs, branches and Bank@Post outlets.

Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Next Payments; Linfox Armaguard; Prosegur; RBA

95 per cent of Australians live within 5.7 kilometres of a Bank@Post outlet, compared with 9.3 and 10 kilometres, respectively, for ATMs and branches operated by ADIs (Table 1 and Graph 3). This is despite there being significantly more ADI ATMs and branches than Bank@Post outlets (see Table 1 and Graph 2). The importance of Bank@Post services to cash access across Australia is indicated by Bank@Post outlets being the closest ADI cash withdrawal point (including branches, ADI ATMs and Bank@Post outlets) for around 37 per cent of Australians in 2020, up from 29 per cent in 2017. The high geographic coverage of Bank@Post outlets likely relates to Australia Post's performance standards, which require (among other items) that 85 per cent of non-metropolitan residents are located within 7.5 kilometres of an Australia Post retail outlet (Australia Post 2020).

Current gaps in cash access points

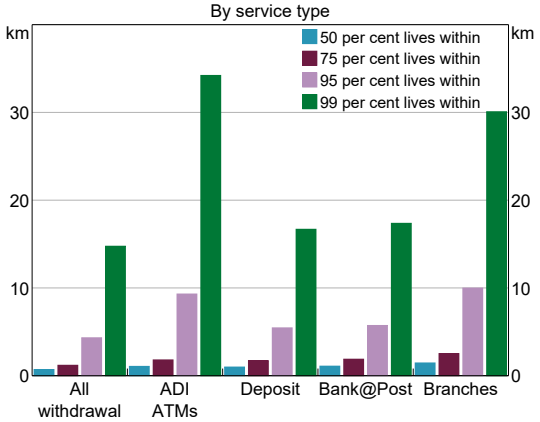
While most Australians lived reasonably close to cash access points, around 1 per cent – or around 250,000 people – lived more than 15 kilometres from their closest cash withdrawal location. As expected, these people generally lived outside major cities (Figure 1, Graph 4).[2] For example, around 25 per cent of Australians in very remote regions had to travel more than 15 kilometres to the nearest cash access location, with a little over 5 per cent of people in these regions needing to travel more than 100 kilometres.

Areas with lower incomes or higher proportion of Indigenous people were more likely to be further away from cash access. The impact of less convenient access to cash in these areas may be heightened given there may also be higher cash use in these areas (Delaney, McClure and Finlay 2020) – for instance, people in a remote area that lacks reliable internet access are more likely to be dependent on cash for making payments. At the same time, it should be acknowledged that travel

Graph 3

Distance to Cash Services

By service type



Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Linfox Armaguard; Next Payments; Prosegur; RBA

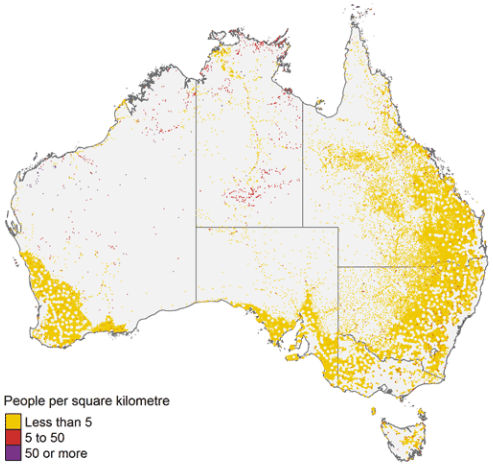
distances are generally larger for *all* services in remote areas.

Most towns (i.e. centres with a population of more than 1,000) continued to have at least one cash access point, although the average number of access points in towns has declined in recent years (Graph 5).[3] The reduction in access points was generally greater in more populated towns, and was concentrated among ADI ATMs and bank branches. This suggests that rationalisation of access points in these towns has largely not had significant aggregate impact on cash access, because most removals have been in centres with multiple alternative cash access points (although closures may still be detrimental to local communities).

Nevertheless, the reduction in bank branches over the past few years in particular means that Bank@Post outlets have become more important at 'filling in the gaps' and providing access to cash deposit functionality in particular. The number of full-service bank branches fell by around 10 per cent between 2017 and 2020. While the closures were highest by number in metropolitan regions, a similar proportion of existing branches were closed across all areas (regional and remote areas lost around 270 full-service branches over this time). Correspondingly, the data suggest the number of towns that are 'branchless' has increased. Bank@Post outlets are therefore now the closest cash deposit point for 61 per cent of the population in very remote areas (compared with 57 per cent in 2017), and for around 55 per cent of Australians in regional areas (Graph 6). In 2020 there were 542 Bank@Post outlets that were 15 kilometres or further away from their nearest bank branch alternative; this is up from 488 outlets in 2017. These outlets were relatively more common in regional and remote Australia, reinforcing the importance of Bank@Post outlets for cash deposit access in these areas.

Figure 1
Population with Least Access to Cash

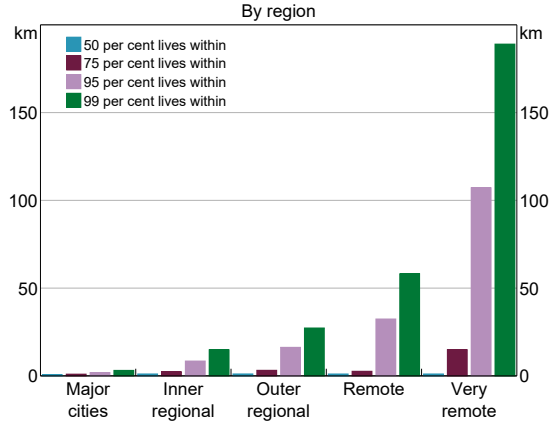
People per square kilometre needing to travel more than 15 kilometres to access cash



Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Next Payments; Linfox Armaguard; Prosegur; RBA

Graph 4
Distance to Cash Withdrawal

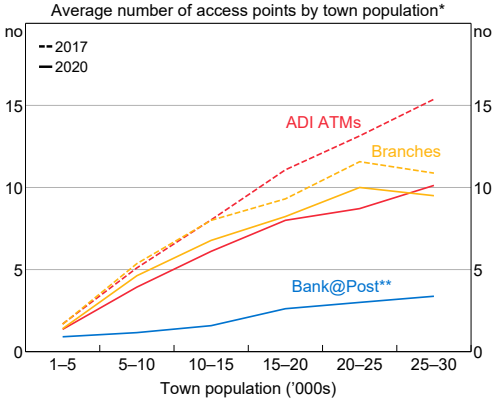
By region



Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Linfox Armaguard; Next Payments; Prosegur; RBA

Graph 5
Access Points in Towns

Average number of access points by town population*



* In urban centres with population between 1,000 and 30,000 people; close by localities are grouped together; left cutoff of bin included in that bin

** The number of Bank@Post outlets changed very little over this time

Sources: ABS; APRA; ggmap; Google; RBA

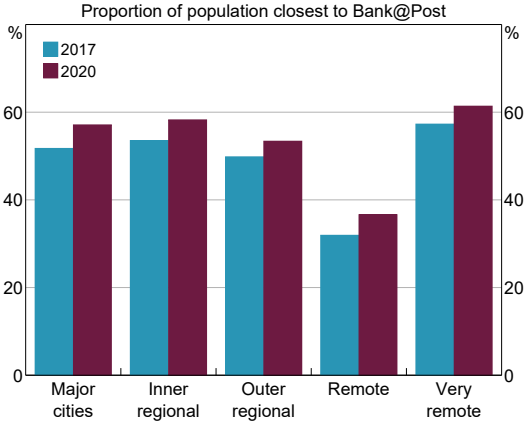
Robustness of cash access

Cash access points in remote areas tended to be more isolated from alternative points, meaning if someone's nearest cash access point was not operating (due to either a temporary unavailability or its removal), they could face an even larger distance to their next closest cash access point. For example, based on our list of identified cash withdrawal points, we estimate around 100, or around 0.5 per cent of, access points did not have an alternative within 50 kilometres. Removal of access points like these could be significantly detrimental to cash access in these areas.

Graph 6

Closest Cash Deposit Point

Proportion of population closest to Bank@Post

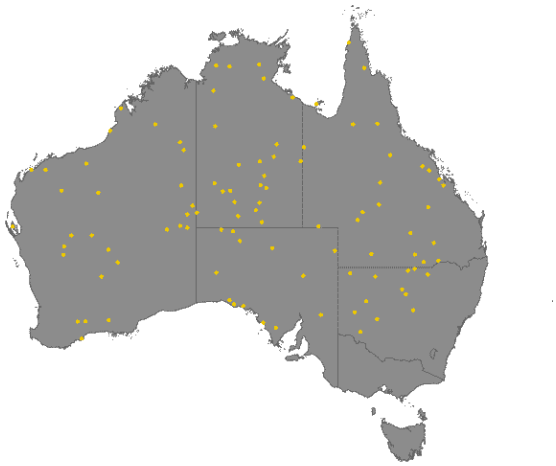


Sources: ABS; APRA; ggmap; Google; RBA

Figure 2

Most Remote Cash Access Point

Cash withdrawal points more than 50 kilometres from nearest alternative



Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Next Payments; Linfox Armaguard; Prosegur; RBA

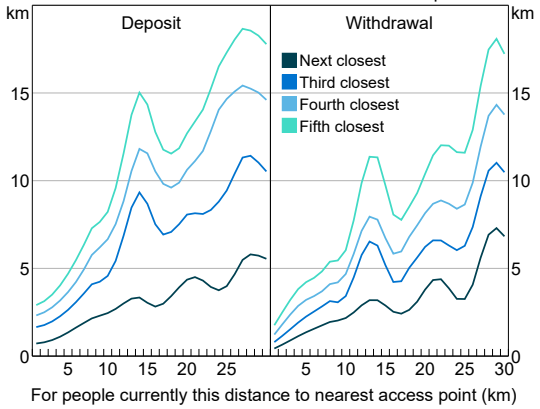
In contrast to the vulnerabilities in remote areas, populations in regional and metropolitan areas typically had more accessible alternative cash access points if their nearest one was unavailable. For example, for people living within 30 kilometres of a cash access point, the average additional distance to the next closest access point was under 10 kilometres for both deposit and withdrawal points (Graph 7, bottom lines). Moreover, around 90 per cent of cash withdrawal points were within 1 kilometre of an alternative, indicating that many access points may be able to be removed without substantially increasing distance to cash access. Nevertheless, as the distance to the nearest cash access point grew, so did the additional distance to the next closest point; this reinforces that those who had to travel further to a cash access point (frequently, those in regional and remote areas) may be more vulnerable to further rationalisation of branches and ATMs.

This vulnerability may be partially offset by the composition of cash access points in remote areas. For example, remoter access points were often Bank@Post outlets or ATMs from the fee-free ATMs in remote Indigenous communities program. These access points may be less likely to be subject to commercial pressures, and so less likely to shut down; in 2017, for example, the fee-free ATMs program was extended for 5 years. In addition, cash-in-transit (CIT) companies Armaguard and Prosegur, which have each made large purchases of bank

Graph 7

Robustness of Cash Access

Additional distance to next closest cash access point*



* Population weighted; smoothed

Sources: ABS; APRA; Australian Banking Association; Banktech; ggmap; Google; Linfox Armaguard; Next Payments; Prosegur; RBA

ATMs to set up their own fleets, have made public statements about expanding their ATM fleets and improving access to cash service points in regional areas (see Lekakis (2020a) and Lekakis (2020b)).

Conclusion

Access to cash services in Australia remains generally good – as of June 2020, 95 per cent of the population lived within 4.3 kilometres of a cash withdrawal point and 5.5 kilometres of a cash deposit point. These average distances were little changed compared with 2017, despite sizeable falls in the total number of cash access points in Australia over this period. However, some towns have more precarious access to cash, with few alternative access points nearby.

Ongoing declines in cash use and cash withdrawals are putting pressure on the economics of the cash system, which may prompt further rationalisation of ATM and bank branch networks in the future. Given the importance of cash in the payments system, the Bank will be continuing to study cash access and use in Australia. This will include work to understand the ongoing demand for cash by households for payments and other purposes – through regular CPSs and work to monitor the acceptance of cash by businesses. The Bank will also be considering potential measures that can help improve the efficiency of wholesale cash distribution, and will be undertaking a consultation on banknote distribution arrangements in the second half of this year (RBA 2021b).

Footnotes

[*] James Caddy is from Payments Policy Department and Zhan Zhang is from Note Issue Department. We would like to thank Banktech, Linfox Armaguard, Next Payments, and Prosegur for providing their ATM location data.

[1] The 2019 CPS was conducted over October to November 2019, prior to the COVID-19 pandemic; see Caddy, Delaney and Fisher (2020) for findings.

[2] The latest available Remoteness Areas data and Australian census results are from 2016, and therefore do not align perfectly with the 2019 Australian Population Grid. Accordingly, populations that cannot be matched to these datasets were excluded in the regional and demographic breakdowns of the results. The ABS measures relative remoteness using the Accessibility and Remoteness Index of Australia, which is broadly calculated by measuring road distance to the nearest towns of various sizes; road distances from remote areas are significantly larger than average. See Hugo Centre (2020) for details.

[3] For this article, we use the ABS' definition of urban Australia (which includes urban centres with a population greater than 1,000 people) as the definition as a town. In addition, urban centres and localities which are close together (less than 5 kilometres from centre to centre) are grouped together into a single town.

References

Australia Post (2020), 'Australia Postal Corporation Annual Report 2019-20'. Available at <https://www.transparency.gov.au/annual-reports/australian-postal-corporation/reporting-year/2019-20-78>.

Australian Banking Association (2017), 'Fee-free ATMs to continue in remote communities', ausbanking.org.au site, 22 December. Available at <https://www.ausbanking.org.au/fee-free-atms-to-continue-in-remote-communities/>.

Caddy J, L Delaney and C Fisher (2020), 'Consumer Payment Behaviour in Australia: Evidence from the 2019 Consumer Payments Survey', RBA Research Discussion Paper No 2020-06.

Chalmers S (2021), 'Banks say branch closures no longer a sign of a town in decline as online shift accelerates, but locals still worried', *Australian Broadcasting Corporation*, 30 April. Available at <https://www.abc.net.au/news/2021-04-30/branches-shut-as-online-banking-rises-but-small-towns-worried/100103484>.

Delaney L, N McClure and R Finlay (2020), 'Cash Use in Australia: Results from the 2019 Consumer Payments Survey', RBA *Bulletin*, June, viewed 8 April 2021. Available at <https://www.rba.gov.au/publications/bulletin/2020/jun/pdf/cash-use-in-australia-results-from-the-2019-consumer-payments-survey.pdf>

Delaney L, R Finlay and A O'Hara (2019), 'Cash Withdrawal Symptoms', RBA *Bulletin*, June, viewed 15 March 2021. Available at <https://www.rba.gov.au/publications/bulletin/2019/jun/cash-withdrawal-symptoms.html>

Guttmann R, C Pavlik, B Ung and G Wang (2021), 'Cash Demand during COVID-19', RBA *Bulletin*, March, viewed 13 April 2021. Available at <https://www.rba.gov.au/publications/bulletin/2021/mar/cash-demand-during-covid-19.html>

Hugo Centre (2020), 'Accessibility/Remoteness Index of Australia (ARIA)', arts.adelaide.edu site, 23 January. Available at <https://arts.adelaide.edu.au/hugo-centre/services/aria>.

Lekakis G (2020a), 'Prosegur unveils Precinct brand in ATM war', BankingDay.com site, 9 December. Available at <https://www.bankingday.com/prosegur-unveils-precinct-brand-in-atm-war>.

Lekakis G (2020b), 'Armaguard pledges cash for the bush', BankingDay.com site, 10 December. Available at <https://www.bankingday.com/armaguard-pledges-cash-for-bush>.

Parliament of Australia Standing Committee on Economics (2021), 'Public Hearings' *Australia's four major banks and other financial institutions: four major banks*, 15 April. Available at <https://www.aph.gov.au/Parliamentary_Business/Committees/House/Economics/FourMajorBanks/Public_Hearings>.

RBA (Reserve Bank of Australia) (2020), 'Payments System Board Annual Report 2020'. Available at <https://www.rba.gov.au/publications/annual-reports/psb/2020/>.

RBA (2021a), 'Corporate Plan', rba.gov site. Available at <https://www.rba.gov.au/about-rba/corporate-plan.html>.

RBA (2021b), 'Payment Systems Board Update: May 2021 Meeting', Media Release No 2021-07, 21 May. Available at <https://www.rba.gov.au/media-releases/2021/mr-21-07.html>.

An Initial Assessment of the Reserve Bank's Bond Purchase Program

Richard Finlay, Dmitry Titkov and Michelle Xiang[*]

Photo: Bunhill – Getty Images

Abstract

This article provides an initial assessment of the effect of the Reserve Bank's bond purchase program on government bond yields. Overall, we estimate that the program has reduced longer-term Australian Government Security (AGS) yields by around 30 basis points and lowered the spread of state and territory bond yields to AGS yields by 5 to 10 basis points, relative to where they would otherwise have been. This reduction in yields occurred partly in anticipation of the program and partly at its announcement. Bond yields have risen noticeably since the program was announced, but this does not imply that the impact of the program was transitory: many factors contribute to changes in bond yields, and our assessment is that bond purchases serve to hold yields lower than they would otherwise have been over an extended period. The bond purchase program has not had any substantial negative impact on the functioning of government bond markets.

Introduction

At the November 2020 Board meeting, the Reserve Bank announced that it would undertake a $100 billion bond purchase program, purchasing $80 billion of Australian Government Securities (AGS) and $20 billion of bonds issued by the state and territory borrowing authorities (semi-government bonds, or semis) over the following 6 months. In February this year, the Board extended the program by announcing the purchase of an additional $100 billion of AGS and semis after the completion of the initial purchases in mid April; market participants widely expected additional purchases but were uncertain about the amount.[1]

The intention of the bond purchase program was to lower government bond yields. Government bonds are the benchmark fixed-income securities in

Australia, and their risk-free yields underpin the pricing of other bonds and term lending rates, and influence the exchange rate. As such, lower government bond yields put downward pressure on funding costs throughout the economy and help to lower the exchange rate, contributing to easier financial conditions and thereby supporting economic activity and inflation. This article assesses how far purchases reduced government bond yields. While bond yields have risen substantially since November 2020, this does not imply that the effect of the program was transitory: many other factors also influence bond yields, and the evidence suggests that bond purchases serve to hold yields lower than they would have otherwise been over an extended period; this is also the evidence from studies of quantitative easing (QE) programs in other countries.[2]

Given that participants in the Australian government bond market are forward-looking, most of the impact of a bond purchase program should occur as market prices adjust in anticipation of the program and/or when it is announced.[3] Reflecting this, our key results come from an event study covering the period leading up to the announcement of the bond purchase program. In particular, from September 2020 financial markets were increasingly pricing-in the possibility that the Reserve Bank would conduct a bond purchase program, with these expectations confirmed at the Board announcement on 3 November. To quantify the impact of this, we identify key events that led financial markets to reassess the likelihood that the Bank would conduct a bond purchase program, and measure the change in government bond yields around these dates. These events include public announcements by the Bank, newspaper articles and market economist reports.

An alternative approach is to construct a counterfactual scenario of what bond yields might have been in the absence of a bond purchase program. Here we consider 2 approaches. The first assumes that AGS yields would have moved in line with those of US Treasury bonds. The second approach constructs a counterfactual based on the historical relationship between AGS yields and a range of financial market factors, both domestic and international. These 2 approaches suggest that the bond purchase program reduced yields by somewhere between 20 and 30 basis points, broadly in line with the results from our event study.

We also assess the effect of the weekly flow of purchases on bond yields over and above the announcement effect (and find that it is small and transient), and discuss the results of a model that seeks to decompose observed bond yields into expectations of future short-term interest rates plus term premia (and find that the former have risen while the latter are low relative to recent history). Finally, we briefly assess whether the bond purchase program has adversely affected government bond market functioning.

International evidence on bond purchases

Bond purchases can lower bond yields via a number of channels. These include:

- portfolio rebalancing – buying bonds bids up their price and removes interest rate risk from the market, reducing term premia and inducing investors to buy other assets, including to replace the bonds that they sold;
- reducing liquidity premia – steady central bank buying reduces the risk of investors being unable to sell bonds at a reasonable price; and
- signalling – bond purchases underline the commitment of the central bank to hold policy rates lower for longer (including because policy rates are unlikely to be raised while bond purchases are ongoing) and so reinforce expectations for a low policy rate.

The empirical literature on bond purchases, based on experience in other countries, suggests that an initial purchase program announcement equivalent to 1 per cent of GDP reduces yields by around 5–7 basis points on average, although the range of estimates is wide.[4] Initial bond purchase programs also tend to have larger apparent impacts than subsequent programs. This is because additional rounds of bond purchases are often expected by markets and so are already priced-in, and it is difficult to disentangle these pre-existing expectations from the new information in an announcement of a program extension. Also, many

Table 1: Key Event Study Days

Date	Event
14 September	Newspaper article ('RBA and markets out of tune')
22 September	Speech by Deputy Governor Debelle
23 September	Market economist report calling for further policy easing
28 September	Market economist report calling for further policy easing
6 October	October Board announcement
7 October	Newspaper article ('odds shortened on more easing')
15 October	Speech by Governor Lowe
26 October	Newspaper article ('RBA to buy bonds')
3 November	November Board announcement

early bond purchase programs were initiated during a period of market stress, when the liquidity premia channel of bond purchases is relatively important, whereas subsequent programs were often implemented in more settled markets when liquidity premia were low (of note, government bond markets were stable and functioning well in November 2020 when the Reserve Bank commenced its bond purchase program).

Applying the international experience to Australia, the bond purchase program announced on 3 November 2020 could have been expected to reduce longer-term yields by around 30 basis points. Further, most of the effect would be expected to come via lower term premia: liquidity premia were already low and, while bond purchases would have had some signalling effect, forward guidance and the 3-year yield target were already providing a powerful signal regarding the direction of future policy.

Estimates of the announcement (or stock) effect

Event study

As noted above, the literature tends to find that most of the impact of bond purchase programs on yields occurs when expectations are formed, rather than when purchases are made. This implies that an event study – where key dates relating to the outcome of interest are identified and the yield change that occurs on those dates is assessed – is a reasonable way to measure the impact. For this event study we identified 9 events in the 2 months preceding the initial announcement of the Bank's bond purchase program. We then summed the cumulative change over those dates in: AGS yields; the spread of AGS yields to overnight indexed swap (OIS) rates; and the spread of semis yields to AGS yields.

To identify events, we examined end-of-day market summary reports written by bond traders and market economists over September and October 2020, and selected those days where a piece of news was widely cited as relevant to the potential for a Reserve Bank bond purchase program. In total we identified 9 such events, which included speeches by Reserve Bank Governor Lowe and Deputy Governor Debelle, the October and November 2020 Reserve Bank Board announcements, 3 newspaper articles, and 2 market economist reports (Table 1). We used a one-day time interval to measure the change in yield following an event – either 'open-to-close' for events that occurred during trading hours, or 'previous close-to-close' for events that occurred before the market opened – but as a robustness check we also considered a two-day event window (results were similar).

AGS yields declined across the curve in response to the identified events, with the cumulative change in yield largest at the 10-year point at around 30 basis points (Graph 1). To the extent that we have correctly identified the key dates when market

participants reassessed the likelihood of the Reserve Bank conducting a bond purchase program, and no other major news occurred on those dates to move yields for other reasons, this suggests that the bond purchase program led to a fall in the 10-year AGS yield of around 30 basis points.

The fall in yields measured above will incorporate all of the channels discussed earlier – the signalling channel, the portfolio rebalancing channel, the liquidity premia channel. However, any signalling effect of bond purchases will also be evident in OIS rates, which provide a measure of market expectations for the evolution of the cash rate.[5] As such, examining how the spread of AGS yields relative to OIS rates changes – that is, using OIS rates as a control variable – allows us to isolate the combined effect of the portfolio rebalancing and liquidity channels of bond purchases. Measuring AGS yields relative to OIS rates also helps to control for any other macroeconomic or financial market news that might have occurred on the event days that was unrelated to bond purchases but affected cash rate expectations. The results of this analysis are presented in Graph 2, and suggest that for shorter-dated maturities out to around 5 years, most of the observed fall in yields was due to lower cash rate expectations, rather than other factors.[6] For bonds with residual maturity of around 10 years, however, the fall in the spread of AGS yields to OIS rates is very similar to the fall in actual AGS yields, at around 30 basis points. This suggests that the fall in 10-year AGS yields was for the most part driven by falls in term and liquidity premia, and most likely the former (because outside of periods of market dysfunction, liquidity premia are typically low in the AGS market).[7]

Finally, the bond purchase program led to a *larger* fall in semis yields than in AGS yields, with the spread of semis yields to AGS yields at the relevant maturities narrowing by around 5 basis points when measured over a one-day event window (Graph 3), and by around 10 basis points when measured over a two-day window.[8] AGS yields act as the benchmark yield curve in Australia, with other fixed-income securities typically priced at a spread to either AGS yields or to swap rates. If the Reserve Bank had elected to purchase only AGS as part of its bond purchase program, it is likely that semis yields would have fallen by roughly the same extent as AGS yields, leaving the spread between semis and AGS little changed. The inclusion of semis in the program put additional downward pressure on semis yields, resulting in a narrowing in spreads.

A counterfactual approach

An alternative approach to measuring the effect of the Reserve Bank's bond purchase program is to construct a counterfactual scenario for how AGS yields might have moved in its absence, and take the difference between the observed yield change and this counterfactual as measuring the impact of the program.

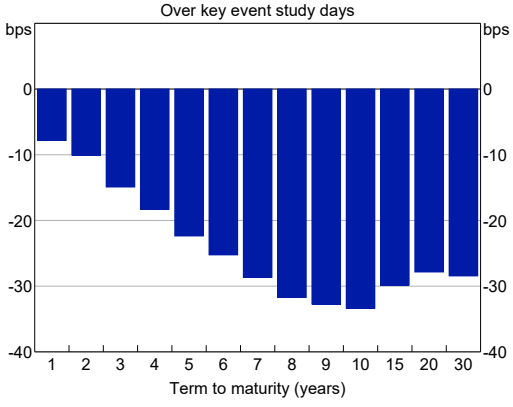
US Treasury yields

A simple counterfactual is to assume that, in the absence of bond purchases by the Reserve Bank,

Graph 1

Change in AGS Yields

Over key event study days

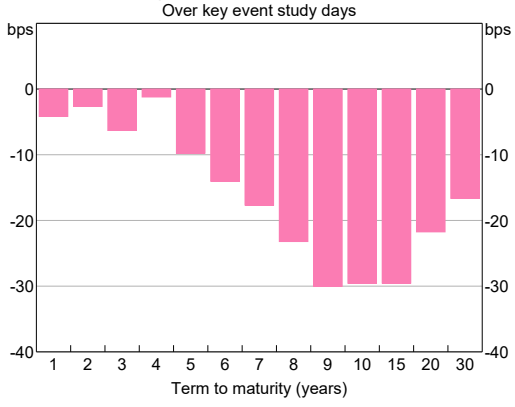


Sources: Bloomberg; RBA

Graph 2

Change in AGS Spread to OIS

Over key event study days



Sources: Bloomberg; RBA

longer-term AGS yields would have moved in line with the government bond yields of the United States.[9] Focusing on the spread between 10-year AGS yields and those of US Treasury bonds, after rising at the onset of the COVID-19 crisis as the relative outlook for US growth, inflation and interest rates deteriorated rapidly, the spread remained stable at around 25–30 basis points through to mid 2020 (Graph 4). However, as market participants began to price-in the likelihood of bond purchases in Australia over September and October 2020, this spread narrowed, reaching around zero when the Bank's bond purchase program was announced in early November. To the extent that the evolution of longer-term US Treasury yields provides a good counterfactual for what would have happened to longer-term AGS yields in the absence of a bond purchase program, this approach also suggests that the bond purchase program led to a fall in longer-term AGS yields of around 30 basis points. With the exception of a short-lived move higher in early 2021 associated with a global increase in bond yields, the spread has remained near zero, suggesting that this (counterfactual) fall in yield has been persistent. The accumulation of further market moving events and differing outcomes for the Australian and US economies will, over time, lessen the validity of this comparison, and we would not expect the spread to remain around zero indefinitely.

A model of AGS yields

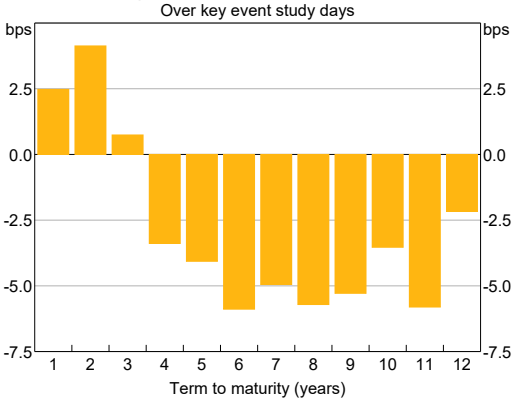
A slightly more sophisticated approach is to construct a model of AGS yields that controls for a range of domestic and international factors, but for the most part does not capture the effect of the Reserve Bank's bond purchase program, and then use the implied path of AGS yields resulting from this model as a counterfactual against which to measure the effect of bond purchases.[10]

The model we employ tries to explain changes in the 10-year AGS yield using changes in the Australian 10-year OIS rate, changes in the 10-year US Treasury yield, changes in US Federal Reserve bond holdings as a share of US GDP, and changes in the spread between the Australian 3-month Bank Bill Swap (BBSW) and 3-month OIS rates. As noted earlier, the 10-year OIS rate will capture market expectations for the cash rate path, and therefore any signalling effect of bond purchases. This implies that our measure will only capture the portfolio rebalancing and liquidity channels of bond purchases and not the signalling channel and, as such, should be taken as a lower bound rather than a central estimate. Regarding the other explanatory variables: the US Treasury yield captures international factors affecting long-term interest rates; US Federal Reserve bond holdings capture bond purchases in the United States; and the 3-month BBSW–OIS spread is a measure of domestic risk aversion. Overall, the counterfactual 10-year AGS yield implied by the model, in the absence of bond purchases, is around 20 basis points higher than the observed 10-year AGS yield,

Graph 3

Change in Semis Spread to AGS*

Over key event study days

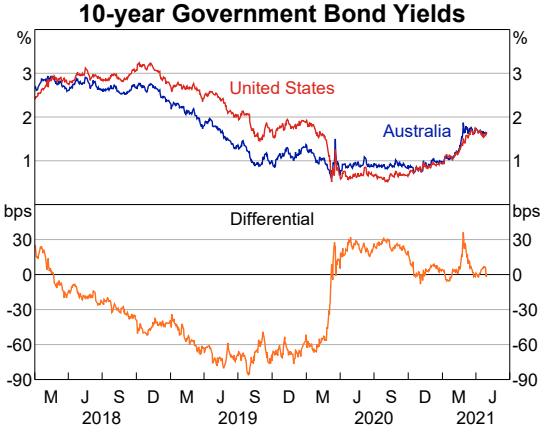


* Median for the states; excludes the territories

Sources: Bloomberg; RBA

Graph 4

10-year Government Bond Yields



Sources: Bloomberg; RBA; Yieldbroker

with the difference persistent over late 2020 and early 2021 (Graph 5). See Appendix for model results.[11]

The implementation (or flow) effect

In addition to the announcement (or stock) effect described above, the Reserve Bank's bond purchases may also have lowered yields as and when the purchases occurred. That is, there may have been effects on yields associated with the flow of purchases, in addition to the effect of the expected total stock of purchases. To assess this we use the fact that certain bonds at certain times were excluded from bond purchase operations, and measure the differential effect on AGS yields and semis spreads of these exclusions. In particular, for AGS purchase operations, the Reserve Bank alternated between purchasing shorter-dated (roughly 5 to 7 years residual maturity) and longer-dated (roughly 7 to 10 years residual maturity) bonds, and also excluded any bonds that had recently been tapped or issued. For semis, the Reserve Bank initially also alternated between shorter-dated and longer-dated bonds (although it combined these groupings in March 2021), and again excluded bonds that had recently been tapped or issued.

Considering first the shorter-dated and longer-dated groupings of bonds separately, we investigate the yield impact of a bond being excluded from an auction due to it being recently tapped or issued. To do this we regress the change in yield (for AGS) or spread to the AGS yield (for semis) over the auction day on a dummy variable indicating 'included' or 'excluded' status, and also control for the effect of each bond line and day. This is equivalent to performing an analysis of variance to test whether, on auction days, bonds that were eligible to be purchased saw statistically different yield changes to bonds that were not eligible to be purchased.[12] All else being equal, a bond being recently tapped or issued might be expected to lead its yield to increase, thus biasing our estimation in favour of finding a flow effect. We find, however, that 'included' status has no impact on a bond's change in yield or spread, suggesting no discernible flow effect.

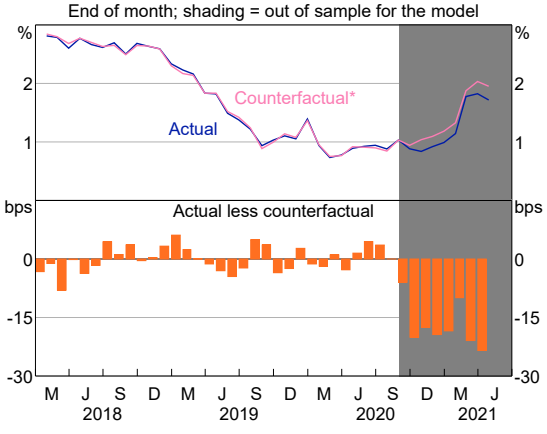
If we consider instead the shorter-dated and longer-dated groupings of bonds together (so that for each bond purchase operation the 'excluded' group of bonds now comprises recently tapped or issued bonds within the relevant maturity grouping, and also all bonds from the other maturity grouping), we find that purchases lowered AGS yields by 0.5 basis points on the day, and lowered semis spreads by 0.2 basis points on the day (see Appendix for model results). These results, combined with those discussed above, suggest that purchases in one segment of the yield curve affect yields and spreads in that part of the yield curve relative to other parts of the yield curve (even if they do not affect relative yields and spreads *within* that segment of the yield curve). However, this flow effect is modest and short lived, disappearing after just a few days.[13]

To summarise, we find that bond purchases can have a small flow effect, but that it is transitory; these findings are broadly in line with the international evidence on bond purchases.

Graph 5

10-year AGS Yield

End of month; shading = out of sample for the model



* Implied by cumulative modelled changes in the 10-year AGS yield

Sources: ASX; Bloomberg; RBA; Tullett Prebon; US Federal Reserve

Expected future short-term rates and term premia

So far we have focused on estimating the effect of the Reserve Bank's bond purchases on the overall level of government bond yields. Bond yields can also be thought of having 2 distinct components: the average short-term interest rate that is expected to prevail over the life of the bond; and the term

premium that investors demand for holding a long-term bond rather than investing in a series of shorter-term investments. Changes in expectations for future short-term interest rates give information on bond investors' expectations of policy rates over coming years, while changes in term premia give information on the level of interest rate and inflation risk that investors perceive, and their attitudes to these risks.

One cannot observe expected future short-term rates or term premia directly by looking at bond yields, since bond yields reflect the combination of both. One can, however, estimate these quantities using a model. A model that is often used for this purpose is a so-called affine term structure model, which assumes that expectations and term premia (and therefore yields) are driven by a few unobserved factors. By estimating those factors, and the model parameters, one can recover estimates of expectations and term premia. It is important to note, however, that a number of assumptions must be made to estimate an affine term structure model, some of which may not hold, and so model outputs should be taken as indicative.[14]

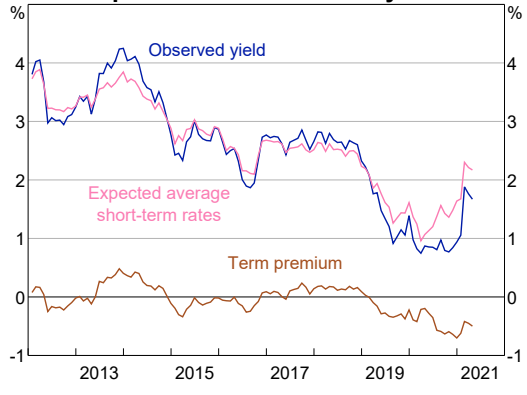
We use the model of Hambur and Finlay (2018) to estimate expected future short-term interest rates and term premia. Graph 6 shows that the 10-year nominal bond yield fell over the first few months of 2020 and reached a low in March of that year, as fears around the health and economic impact of COVID-19 grew. The 10-year yield stayed in a relatively narrow range over the remainder of 2020, before increasing in early 2021 alongside increasing optimism regarding the economic outlook. Underlying these movements, however, are divergent trends in estimates of expectations for future short-term rates and term premia. In particular, the onset of the crisis saw expectations of average future short-term rates over the following 10 years fall substantially, but they have since rebounded to be around the levels of 2017 and 2018. The term premium, by contrast, rose as the crisis intensified, but then fell over the remainder of 2020. These outcomes align with what one might have expected: as the crisis intensified investors began to expect that the Reserve Bank would hold policy rates low for many years into the future. At the same time, the amount of risk in the economy was clearly increasing, and investors' desire to bear that risk was falling, leading to higher term premia. But as governments and central banks responded to the crisis, and as effective vaccines were developed, investors became more optimistic about future prospects and so raised their expectations for average future short-term interest rates over the following 10 years. At the same time, the perceived riskiness of holding bonds fell, and investors' appetite to bear risk increased, pushing down on term premia.[15]

Purchases of government bonds by the Reserve Bank contributed to these developments in a few ways: these purchases reduced the risk that bond yields would rise in a dramatic and disorderly fashion, thereby reducing term premia; they pushed down on term premia directly via the portfolio rebalance channel; and by supporting the economy they helped to raise investors' expectations for future short-term interest rates.

One can decompose the 3 nominal time series presented in Graph 6 further, with each composed of a real component and an inflation-compensation component. That is, expectations for average future nominal short-term rates over the following 10 years can be thought of as comprising expectations for average future real (i.e. inflation-adjusted) short-term rates plus expectations for average future inflation, and similarly for term premia. These decompositions are shown in Graphs 7 and 8, and suggest that the fall and then increase in nominal short-term interest rate expectations was largely

Graph 6

Decomposition of Nominal 10-year Yield



Source: RBA

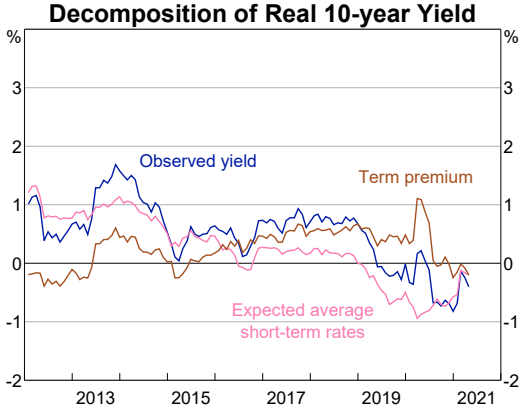
driven by moves in real rate expectations, which were likely to have been related to lower real growth expectations initially, which then recovered. Meanwhile, changes in inflation expectations were similar in direction but more muted. It was also a sharp move higher in real term premia in early 2020 that drove nominal term premia higher, while the inflation risk premium initially fell. These moves were then reversed over the rest of 2020 and into 2021. Higher real term premia reflect uncertainty around future real interest rates, in turn driven by uncertainty around economic growth, while lower inflation risk premia reflect less concern around the risk of high future inflation.

Potential effects on market functioning

As mentioned above, the international experience suggests that bond purchases can support good bond market function and lower liquidity premia, particularly in times of market stress. However, a central bank buying a large share of outstanding government bonds could, in principle, impinge on the operation of the government bond market. For example, if the Reserve Bank were to buy a very large share of a particular bond line so as to create considerable scarcity of that bond in the market, bond dealers may find it hard to source sufficient quantities of the bond to sell to their clients and so be reluctant to post prices or conduct trades. This could reduce liquidity in the market and contribute to an increase in market volatility, as well as lead to a widening in bid–offer spreads and the emergence of pricing anomalies (for example, bonds of a similar maturity having markedly different yields). At the extreme, this could diminish the attractiveness of the government bond market for investors and could contribute to a persistent rise in the liquidity premia for government bonds in Australia, which would be counterproductive given that the aim of the Bank's purchases is to contribute to lower yields. It could also lessen the extent to which government bond yields anchor other interest rates in the economy.

Graph 7

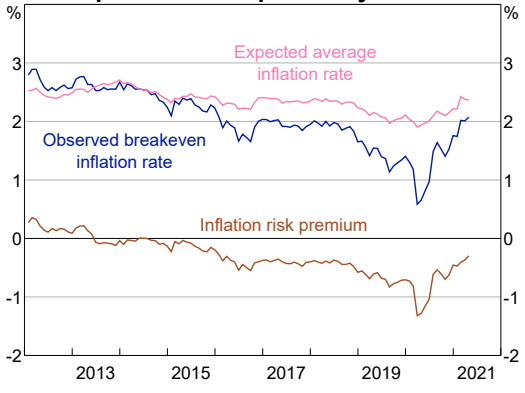
Decomposition of Real 10-year Yield



Source: RBA

Graph 8

Decomposition of Implied 10-year Inflation



Source: RBA

It is difficult to assess with any precision the point at which bond purchases might turn from supporting market function to adversely affecting it, but the evidence suggests that this point is some way off in Australia. Central banks in other advanced economies have purchased much larger shares of outstanding government bonds than the share implied by the Bank's bond purchase program. And these purchases have generally not contributed to a decline in market functioning. Additionally, the empirical literature is inconclusive about the *direction* of the effects of bond purchases on market function even when the central bank already holds a substantial share of the market, although there is clearer evidence of negative impacts emerging at very high shares of central bank holdings (see, for example, Han and Seneviratne 2018).

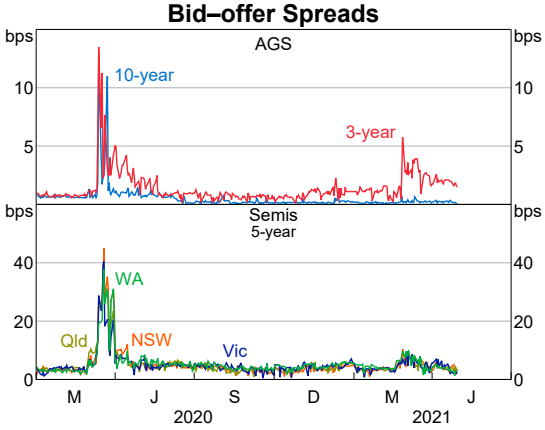
To date, there is no evidence of any adverse impacts of the Reserve Bank's bond purchase program, although there is some evidence that the Bank's 3-year yield target, and the sizeable holdings of the 3-year AGS, have resulted in some pricing anomalies in the short end of the yield curve. In particular,

bid–offer spreads are near historical lows for longer-term AGS and for semis, but are a little higher than usual for shorter-maturity AGS (although still well below the spreads observed during the period of market distress in March and April 2020; Graph 9). Yield curve fitting errors – which can be used as a measure of pricing discrepancies between otherwise similar bonds – are currently within their historical range for bonds that are eligible for the bond purchase program (Graph 10).[16]

To support good bond market function, the Bank has been willing to lend AGS and semis to market participants from its own portfolio, and the Bank also operates a lending facility on behalf of the Australian Office of Financial Management (AOFM). The Bank will also consider proposals to sell government bonds that it owns outright against an offsetting (duration-neutral) purchase of government bonds (so-called switches).[17]

Graph 9

Bid–offer Spreads

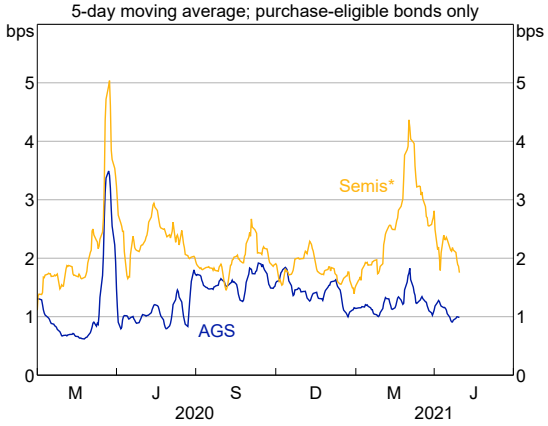


Sources: RBA; Yieldbroker

Graph 10

Yield Curve Fitting Errors

5-day moving average; purchase-eligible bonds only



* Simple average for the states and territories

Sources: Bloomberg; RBA

Appendix

Table A1: Linear Regressions of Changes in the 10-year AGS Yield

Percentage points; monthly, from start 2018 to end August 2020; all variables in first-difference terms[(a)]

	Model 1 Includes RBA bond holdings to Australian GDP[(b)]	Model 2 Includes 3-month USD LIBOR–OIS spread	Model 3 Includes 10-year US Treasury yield–OIS spread	Preferred model Insignificant variables dropped
10-year AUD OIS rate	0.79***	0.78***	0.81***	0.76***
	(0.09)	(0.09)	(0.09)	(0.08)
10-year US Treasury yield	0.23***	0.24***	0.22***	0.24***
	(0.07)	(0.07)	(0.07)	(0.06)
10-year US Treasury yield–OIS spread	0.32	0.30	0.32	
	(0.33)	(0.32)	(0.32)	
RBA bond holdings to GDP	0.02			
	(0.06)			
US Fed bond holdings to GDP	0.04**	0.04***	0.04***	0.04***
	(0.02)	(0.01)	(0.01)	(0.01)
3-month BBSW–OIS spread	0.20*	0.19*	0.21**	0.18*
	(0.10)	(0.10)	(0.10)	(0.09)
3-month USD LIBOR–OIS spread	0.02	0.03		
	(0.04)	(0.03)		
Intercept	0.00	0.00	0.00	–0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Adjusted R^2	0.94	0.94	0.94	0.94
Durbin-Watson statistic	2.37	2.36	2.50	2.57

(a) Parentheses show standard errors; *, ** and *** denote statistical significance at the 10, 5 and 1 per cent levels, respectively; estimated zero-coupon yields were used for AGS and US Treasury yields throughout the models

(b) Within the sample for the model, changes in RBA bond holdings were driven by purchases for liquidity management and maturities and, starting from March 2020, by purchases to support market functioning and the 3-year AGS yield target

Sources: ASX; Bloomberg; RBA; Tullett Prebon; US Federal Reserve

Table A2: Linear Regressions of Yield and Spread Changes on Bond Purchase Days

Yield and spread change in basis points; includes all bonds purchased under the bond purchase program[(a)]

	AGS yield	Semis spread
Purchase eligibility dummy	–0.51***	–0.19**
	(0.12)	(0.07)
Fixed effects	Bond and time	Bond and time
Adjusted R^2	0.91	0.34

(a) Parentheses show standard errors; *, ** and *** denote statistical significance at the 10, 5 and 1 per cent levels, respectively

Sources: RBA; Reuters

Footnotes

[*] The authors are from Domestic Markets Department.

[1] A poll by Reuters ahead of the February 2021 Board meeting found that market economists expected the Reserve Bank to announce a further program of purchases of around $80 billion on average, with the modal expectation being for a $100 billion extension.

[2] See for example Ihrig *et al* (2018) and Eser *et al* (2019).

[3] See for example Arrata and Nguyen (2017), De Santis and Holm-Hadulla (2017), and D'Amico and King (2013).

[4] See, for example, Bailey *et al* (2020), Bank of England (2021), CGFS (2019), and Gagnon (2016) for review papers.

[5] Note that in Australia long-dated OIS rates are priced based on the prevailing rates on 2 other types of financial instruments: fixed-to-floating interest rate swaps and basis swaps, both of which are liquid out to 10 or more years into the future. In a fixed-to-floating interest rate swap, one party receives a fixed interest rate (the 'swap rate') in exchange for paying a floating 3- or 6-month Bank Bill Swap (BBSW) rate. In a BBSW–OIS basis swap, one party pays the floating 3- or 6-month BBSW rate, and receives a floating rate that is linked to the realised cash rate. By entering both of these swaps, one can engineer an exposure where one receives a fixed rate and pays a floating rate linked to the realised cash rate, which is what an OIS contract delivers.

[6] This is unsurprising as the Reserve Bank Board also lowered the cash rate target and the target for the yield on the 3-year Australian Government bond from 25 basis points to 10 basis points at the November 2020 Board meeting.

[7] In fact, the expected impact of bond purchases on longer-term policy rate expectations is ambiguous. On the one hand, bond purchases serve to underline the central bank's commitment to keep policy rates low for a long period. But, conversely, bond purchases should boost economic activity and inflation and so bring forward the day when the policy rate needs to be increased.

[8] Semis are less liquid than AGS, and so measuring yield changes over a slightly longer window may be appropriate.

[9] This approach makes a few assumptions. In particular, it assumes that AGS yields tend to move with US Treasury yields in response to global news events (but not necessarily news pertaining to a change in the relative economic prospects or stance of monetary policy in each country). Another assumption is that the main news on relative monetary policy stances over the period in question related to domestic bond purchase expectations.

[10] See Kawamoto *et al* (2021) for a similar exercise focused on Japan. Ideally, we would prefer to construct a model of AGS yields that accurately captured the channels of a bond purchase program discussed earlier, and then use this model to directly measure the impact of bond purchases on yields. The relatively short time horizon over which the Reserve Bank has been conducting bond purchases, however, means that any such model would be poorly estimated. Further, and as discussed earlier, market participants' expectations of bond purchases are an important determinant of yields, and we do not have an accurate measure of these expectations through time. Together, these difficulties make estimating a model of yields that directly captures the effect of bond purchases unviable in the current context.

[11] Modelling the spread between 10-year AGS and US Treasury yields, and/or including additional explanatory variables (such as RBA bond holdings, the 10-year US OIS rate, and the 3-month USD LIBOR–OIS spread), all produced similar results. The additional explanatory variables that we tested were not statistically significant, and so we did not include them in our preferred model.

[12] See Fisher (1925).

[13] Other approaches to estimating flow effects, including regressing daily yield changes on the share of remaining free float of a bond line purchased by the Reserve Bank, and regressing the total change in yield between November 2020 and April 2021 for each bond on the total share of free float purchased by the Reserve Bank over that period, also suggested no significant flow effects.

[14] The model separates expectations from term premia using the time-series properties of the estimated factors (which evolve according to the distribution under which expectations are formed), and also survey data on economists' cash rate and inflation expectations (which do not contain term premia).

[15] Term premia are also estimated to be quite low in the years preceding the pandemic, and earlier bond purchase programs by other central banks are likely to have contributed to this.

[16] Yield curve fitting errors are measured as the difference between a smooth yield curve fitted to the underlying yield data, and the actual yields, which may not lie on a smooth curve; see Finlay, Seibold and Xiang (2020) for further discussion of this measure of market function.

[17] Switches are currently considered for semis only; details of these operations can be found in Statistical Table A3.2, available at https://www.rba.gov.au/statistics/tables/xls/a03-2hist.xlsx.

References

Arrata W and B Nguyen (2017). 'Price impact of bond supply shocks: Evidence from the Eurosystem's asset purchase program', BdF Working Paper 623. Available at <https://publications.banque-france.fr/en/price-impact-bond-supply-shocks-evidence-eurosystems-asset-purchase-program>

Bailey A, J Bridges, R Harrison, J Jones and A Mankodi (2020). 'The central bank balance sheet as a policy tool: Past, present and future', paper prepared for the Jackson Hole Economic Policy Symposium, 27–28 August 2020. Available at <https://www.bankofengland.co.uk/working-paper/2020/the-central-bank-balance-sheet-as-a-policy-tool-past-present-and-future>

Bank of England (2021), 'IEO evaluation of the Bank of England's approach to quantitative easing', January. Available at <https://www.bankofengland.co.uk/independent-evaluation-office/ieo-report-january-2021/ieo-evaluation-of-the-bank-of-englands-approach-to-quantitative-easing>

Committee on the Global Financial System (CGFS) (2019), 'Unconventional monetary policy tools: A cross-country analysis'. Available at <https://www.bis.org/publ/cgfs63.pdf>

D'Amico S and T King (2013). 'Flow and stock effects of large-scale treasury purchases: Evidence on the importance of local supply', *Journal of Financial Economics* 108 (2), pp 425–448. Available at <https://doi.org/10.1016/j.jfineco.2012.11.007>

De Santis R and F Holm-Hadulla (2019). 'Flow effects of central bank asset purchases on sovereign bond prices: Evidence from a natural experiment', *Journal of Money, Credit and Banking* 52 (6), pp 1467–1491. Available at <https://doi.org/10.1111/jmcb.12665>

Eser F, W Lemke, K Nyholm, S Radde and A Vladu (2019), 'Tracing the impact of the ECB's Asset Purchase Program on the yield curve', ECB Working Paper 2293. Available at <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2293~41f7613883.en.pdf>

Finlay R, C Seibold and M Xiang (2020), 'Government bond market functioning and COVID-19', RBA *Bulletin*, viewed 21 February 2021. Available at https://www.rba.gov.au/publications/bulletin/2020/sep/government-bond-market-functioning-and-covid-19.html

Fisher R (1925). *Statistical Methods for Research Workers*, Oliver and Boyd, London. Available at <http://psychclassics.yorku.ca/Fisher/Methods/>

Gagnon J (2016), 'Quantitative easing: An underappreciated success', PIIE Policy Brief April. Available at <https://www.piie.com/publications/policy-briefs/quantitative-easing-underappreciated-success>

Hambur J and R Finlay (2018), 'Affine endeavour: Estimating a joint model of the nominal and real term structures of interest rates in Australia', RBA RDP 2018-02. Available at https://www.rba.gov.au/publications/rdp/2018/2018-02.html

Han F and D Seneviratne (2018), 'Scarcity effects of quantitative easing on market liquidity: Evidence from the Japanese government bond market', IMF Working Paper No. 18/96. Available at <https://www.imf.org/-/media/Files/Publications/WP/2018/wp1896.ashx>

Ihrig, J, E Klee, C Li, M Wei J and Kachovec (2018), 'Expectations about the Federal Reserve's balance sheet and the term structure of interest rates', *International Journal of Central Banking* 14 (2), pp 341–90. Available at <https://www.ijcb.org/journal/ijcb18q1a8.htm>

Kawamoto T, T Nakazawa, Y Kishaba, K Matsumura and J Nakajima (2021), 'Estimating effects of expansionary monetary policy since the introduction of quantitative and qualitative monetary easing (QQE) using the macroeconomic model (Q-JEM)', Bank of Japan Working Paper No. 21 E4. Available at <https://www.boj.or.jp/en/research/wps_rev/wps_2021/data/wp21e04.pdf>

Monetary Policy, Liquidity, and the Central Bank Balance Sheet

Sean Dowling and Sebastien Printant[*]

Photo: Yuichiro Chino – Getty Images

Abstract

In response to the COVID-19 pandemic, the Reserve Bank deployed a number of monetary policy tools, including some new measures, to support the economy and address disruptions to the smooth functioning of financial markets. This new mix of policy tools has changed how the Reserve Bank implements monetary policy, and has significantly increased the size of the Bank's balance sheet and the amount of liquidity in the banking system.

Monetary policy before the pandemic

Before March 2020, the Reserve Bank implemented monetary policy by setting a target for the cash rate and closely managing the supply of system-wide Exchange Settlement (ES) balances to achieve that target.[1] ES balances are at-call deposits held at the Reserve Bank that banks use to settle their payment obligations with each other. The cash rate is the interest rate at which banks lend ES balances to each other on an overnight unsecured basis. If the supply of ES balances exceeds demand, banks have an incentive to lend their surplus cash in the overnight cash market below the target cash rate, while a shortage of cash would put pressure on the cash rate rising above the target (Domestic Markets Department 2019).

Transactions between the Reserve Bank (and its clients) and commercial banks (and their clients) change the supply of ES balances on a daily basis. For example, the Reserve Bank is the banker for the Australian Government and large flows such as tax receipts or government expenditures give rise to large changes in daily ES balances, even though the impact of government finances on system liquidity is broadly neutral over a longer horizon (as government inflows are ultimately broadly matched by government outflows).

In an environment of relatively low system liquidity, to ensure that the level of ES balances remained consistent with demand at the cash rate target and to avoid potential volatility in the cash rate or

disruptions in the overnight cash market and payments system, the Reserve Bank would offset large flows through its daily liquidity operations. Reverse repurchase agreements (repos) contracted in open market operations (OMO) and foreign exchange (FX) swaps were used to inject liquidity when ES balances were projected to fall, and drain liquidity when they were projected to rise.

The pandemic response: using existing policy tools to address a surge in liquidity demand …

In late February and through March 2020, the spread of COVID-19 led to the emergence of stresses in global and Australian financial markets as uncertainty rose and downside risks to the economic outlook intensified (RBA 2020). Volatility rose sharply for the prices of many financial assets and signs of dysfunction arose in key financial markets, most notably in government bond markets (Debelle 2020; Kent 2020a).

These stresses led to a sharp rise in the demand for liquidity (Bank for International Settlements 2020; RBA 2020). In Australia, counterparties bid for significantly larger quantities of repo funding at OMO and at higher rates (Graph 1). Had this additional demand gone unfilled, financial conditions would have tightened further. To mitigate this risk, the focus of the Reserve Bank's OMO shifted to providing liquidity support to the financial system. In the first 3 weeks of March, the Reserve Bank's repo operations injected around $45 billion more than what was required to maintain a stable supply of ES balances – a marked departure from the pre-pandemic framework of tight liquidity management (Graph 2). Market operations were also conducted at much longer tenors to provide greater funding stability for the financial system in a period of elevated economic and financial market uncertainty. The Reserve Bank committed to offer one-month and 3-month OMO repos daily and a 6-month term at least weekly, as long as warranted. These actions alleviated funding pressures in the banking system and met the increase in precautionary demand for liquidity.

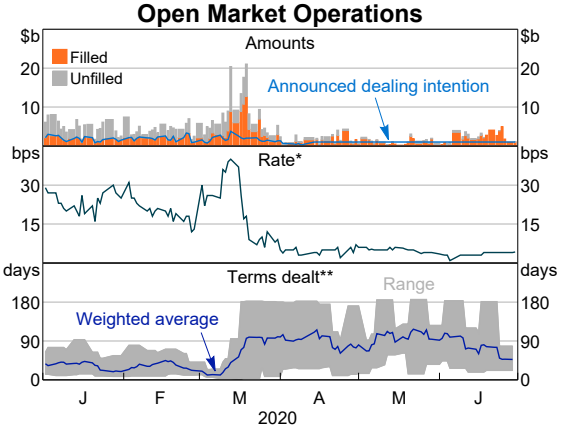
… and introducing a broader policy toolkit to support the economy and market functioning

In addition to providing liquidity support to the financial system through its liquidity operations, the Reserve Bank deployed a number of measures to provide wider support to the economy and address dysfunction in financial markets arising from the pandemic (RBA 2021; Debelle 2021). Since their introduction, these measures have been adjusted in response to the changing outlook for the economy. The Reserve Bank's policy actions have included:[2]

- A reduction in the cash rate target from 0.75 per cent to 0.5 per cent in early March, followed by an additional cut to 0.25 per cent in mid March. In November 2020, the cash rate

Graph 1

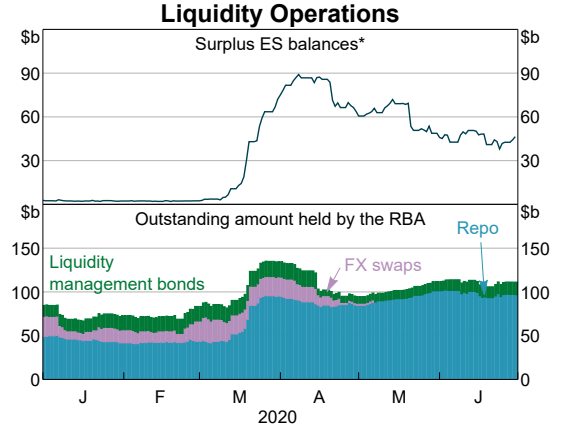
Open Market Operations



* Weighted average spread to term-matched overnight indexed swap
** Five-day rolling window
Source: RBA

Graph 2

Liquidity Operations



* Total ES balances net of contracted open repo positions; for more details, see Domestic Markets Department (2019)
Source: RBA

target was lowered further to 0.10 per cent. The Reserve Bank Board also committed to not increase the cash rate target until 'progress is being made towards full employment and it is confident that inflation is sustainably within the 2–3 per cent target band'.

- A target for the yield on the 3-year Australian Government bond of around 0.25 per cent, introduced in March 2020, and cut to 0.1 per cent in November 2020. The Reserve Bank has committed to purchase Australian Government Securities (AGS) as required to achieve this target. The 3-year yield target reinforces the Board's forward guidance on the cash rate target and helps to lower borrowing costs for businesses and households.
- A commitment to purchase government bonds to support market functioning as required. These purchases are in addition to those made as part of the Reserve Bank's other policy actions.
- A term funding facility (TFF) announced in March 2020 to provide 3-year repo funding for the banking system, with particular support for credit to small and medium-sized businesses. Initial funding allowances equal to 3 per cent of each eligible institution's total credit outstanding could be drawn down by the end of September 2020. Institutions could also access an additional allowance if they increased their lending to small and medium-sized businesses and, from October 2020, a supplementary allowance (equal to 2 per cent of their outstanding credit). The deadline for drawing down the additional and supplementary allowances is 30 June 2021.
- A program of longer-term government bond purchases. Under the bond purchase program (BPP), the Reserve Bank buys AGS and bonds issued by the state and territory borrowing authorities (semis) with residual terms to maturity of around 5 to 10 years. The initial program was $100 billion in size and commenced in November 2020. In February 2021, the Board announced that an additional $100 billion of bonds would be purchased when the initial program concluded in April 2021.

Reflecting the broader range of policy measures, the size and composition of the Reserve Bank's operations in financial markets has changed significantly over the past year (Graph 3). Take-up of the TFF was initially gradual but accelerated in the lead-up to the deadline for initial allowance drawdowns (Alston *et al* 2020). Ahead of the deadline to draw down additional and supplementary TFF allowances, take-up of the TFF has begun to pick up again.

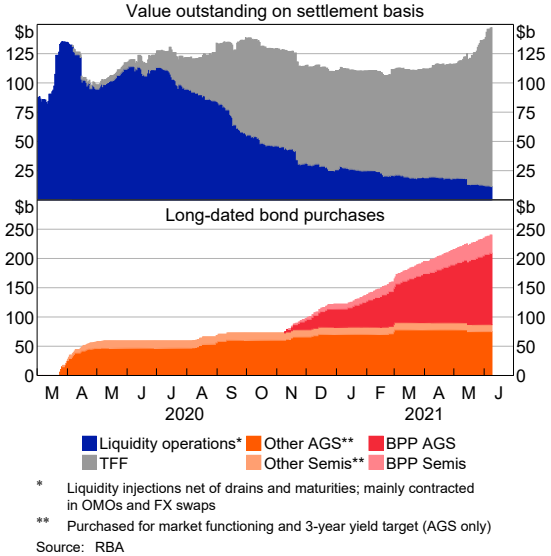
Since March 2020, the Reserve Bank has purchased around $240 billion in government bonds, expressed in market value terms. In the early stages of the pandemic, the Reserve Bank purchased around $60 billion of AGS and semis to address market dysfunction and achieve the 3-year yield target. Since then, another $30 billion of AGS have been purchased to keep the 3-year yield around the target. To date, around $155 billion of bonds have been purchased under the Bank's BPP.

The new monetary policy measures have significantly added to system liquidity (discussed further below). The Reserve Bank chose to provide more monetary stimulus than otherwise by leaving this additional liquidity in the banking system instead of conducting offsetting market operations (Kent 2020b). A consequence of this is that the size

Graph 3

Monetary Policy Operations

Value outstanding on settlement basis



* Liquidity injections net of drains and maturities; mainly contracted in OMOs and FX swaps

** Purchased for market functioning and 3-year yield target (AGS only)

Source: RBA

of liquidity operations is no longer set to target a particular level of ES balances each day. Instead, since April 2020 daily OMO have provided repo funding in full to all participants who submit bids for the Reserve Bank's preferred terms at or above a stable rate (since November 2020, this has been 0.10 per cent, consistent with the new cash rate target and 3-year yield target announced at the November Board meeting). While the size of these operations initially rose sharply, since the middle of 2020 they have been significantly below pre-pandemic levels, reflecting the increase in liquidity in the banking system and substitution towards longer-term TFF funding (Graph 3). Because the liquidity impact of large government flows does not need to be managed as closely as previously, the Reserve Bank has not contracted any FX swaps for this purpose since March 2020.

The Reserve Bank's policy measures have led to a large increase in liquidity in the banking system

The policy measures introduced by the Reserve Bank since the start of the pandemic have contributed to a significant increase in liquidity in the banking system (Graph 4). The supply of surplus ES balances has risen to around $250 billion compared to a pre-pandemic average of $2–3 billion. TFF drawdowns and the Reserve Bank's bond purchases have injected around $380 billion of liquidity, more than offsetting a $60 billion liquidity withdrawal due to the decline in the amount of outstanding OMO repos and FX swaps.

While the Reserve Bank's policy measures have led to an increase in liquidity, the outstanding amount of surplus ES balances is also affected by other transactions. As previously mentioned, the most significant of these transactions for system liquidity (outside policy transactions) tend to be made by the Australian Government. Between March and September 2020, government transactions reduced liquidity by about $90 billion as the pace of AGS issuance increased by more than (net) spending by the government. More recently, government flows have injected around $15 billion in liquidity as AGS issuance has slowed and government spending has picked up.

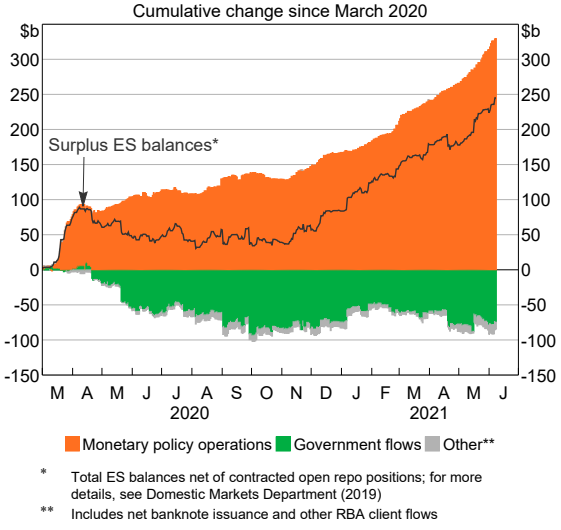
Because of the design of the Reserve Bank's policy measures, the increase in the supply of ES balances will not be permanent. Funding provided to banks under the TFF will need to be repaid to the Reserve Bank 3 years after it is received (or earlier if the banks choose), which will result in a reduction in banks' ES balances. And when the Reserve Bank's holdings of semis mature, funds are debited from the accounts that state and territory governments hold at commercial banks. In turn, these banks will pay the Reserve Bank by transferring ES balances, resulting in an overall decline in the supply of ES balances.

When the Reserve Bank's holdings of Australian Government bonds mature, there is ultimately also a decline in ES balances, although the timing of this effect is less straightforward than it is for semis. Because the Reserve Bank is the banker for the Australian Government, all principal and interest payments on Australian Government bonds are funded through the government's deposits held at the Reserve Bank. When these payments are made to the Reserve Bank, the size and composition of the Reserve Bank's balance sheet will change: when Australian Government bonds mature, assets will decline because the bonds that the Bank once held have matured and liabilities will fall, reflecting a reduction in the size of government deposits. Because none of these flows reach the commercial banking sector, there is no direct impact on ES

Graph 4

Exchange Settlement Balances

Cumulative change since March 2020



* Total ES balances net of contracted open repo positions; for more details, see Domestic Markets Department (2019)

** Includes net banknote issuance and other RBA client flows

Source: RBA

balances. However, these AGS maturities will still lead to a reduction in ES balances. The Australian Government currently has around $60 billion in deposits at the Reserve Bank, while the Bank holds around $180 billion of Australian Government bonds. As such, the Australian Government will ultimately need to raise additional funds to repay these bonds, either by issuing new AGS to the private sector or via increased revenue and/or reduced expenditure. All these options would result in a net increase in cash flow from the private sector to the government and so lead to a decline in ES balances.

The Reserve Bank balance sheet

The size and composition of the Reserve Bank's balance sheet has changed significantly since the onset of the pandemic, reflecting the Bank's recent policy measures. Accordingly, these balance sheet changes can provide insights on the Reserve Bank's policy stance (Kent 2020b). This is different to the pre-pandemic period when the size of the balance sheet was largely independent of the stance of policy.

Before the pandemic, changes in the balance sheet were largely driven by liabilities …

Before the pandemic, variations in the size of the balance sheet were largely driven by changes in liabilities that were beyond the Reserve Bank's control (Graph 5 and Graph 6). For example, the Australian Government and other clients of the Reserve Bank decide upon the size of their deposit balances, and the stock of banknotes in circulation changes in line with the demand for physical cash. Changes in the size of these liabilities have a liquidity impact.[3] To ensure that the supply of ES balances remained consistent with demand at the cash rate target, the Reserve Bank would offset these changes by transacting repos, FX swaps and outright purchases of securities close to maturity. In other words, material changes in liabilities were externally determined and the Reserve Bank would decide on the mix of assets to hold that would best meet its monetary policy objectives.[4] Over time, the composition of assets between repos, FX swaps and securities would vary in response to pricing, market functioning and other policy considerations.

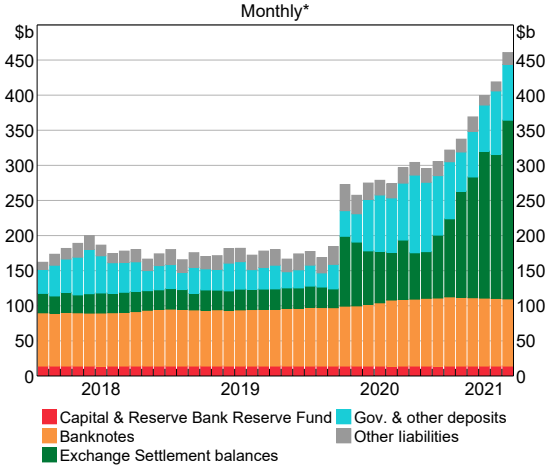
… but now, strong growth in assets is driving changes in the balance sheet

Since the introduction of the Reserve Bank's policy measures in early March 2020, the balance sheet has nearly tripled in size from around $170 billion to more than $460 billion. This increase is equivalent to around 15 per cent of GDP. In contrast to the decade prior to the pandemic, the Reserve Bank's policy measures have directly influenced the size of its balance sheet. Accordingly, the size and

Graph 5

Reserve Bank Liabilities

Monthly*



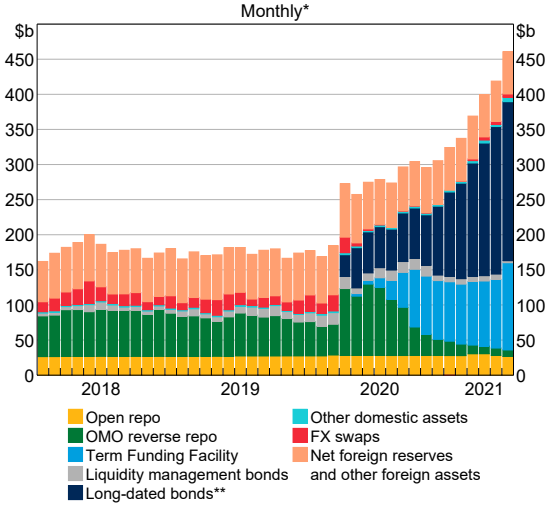
* Latest data are as at end May 2021

Source: RBA

Graph 6

Reserve Bank Assets

Monthly*



* Latest data are as at end May 2021

** Purchased under programs announced in March and November 2020

Source: RBA

composition of the balance sheet can reveal how these policy measures have been used, and provide insights into the Reserve Bank's policy stance.

Reflecting the initial policy response to the pandemic, the Reserve Bank's balance sheet grew by around $90 billion between early March and early April 2020. The stock of outstanding OMO repos (also known as the OMO repo book) doubled in size to $100 billion, and accounted for as much as 37 per cent of the Reserve Bank's assets in June 2020 (compared to around 25 per cent before the pandemic). More recently, the OMO repo book has fallen to around $10 billion, its lowest level since 2013. The Australian dollar FX swap book has decreased in size as previously contracted swaps rolled off and no new FX swaps have been contracted for liquidity management purposes since March 2020. At the same time, the TFF has grown to $127 billion and comprises around 27 per cent of total assets.

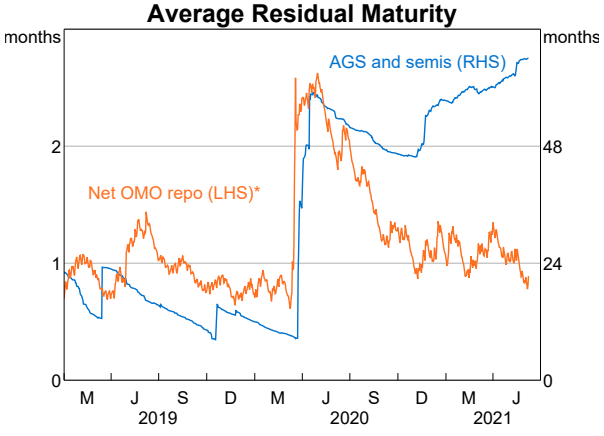
The Reserve Bank's outright holdings of government bonds have risen by around $230 billion, and now make up around half of total assets. Before the onset of COVID-19, the Reserve Bank's holdings of government bonds were much smaller – typically making up between 5 and 10 per cent of total assets. As previously discussed, the Reserve Bank is purchasing government bonds with much longer residual maturities as part of its policy response to the pandemic. As a result, the average term to maturity of the Reserve Bank's outright government bond holdings has increased to around 5 and a half years, from around 15 months previously (Graph 7).

An increase in the Reserve Bank's assets is associated with a corresponding increase in liabilities. Recall from the earlier discussion that all transactions between the Reserve Bank and other market participants will change the supply of ES balances. The Reserve Bank has funded the acquisition of assets from the private sector through the creation of ES balances, which are liabilities of the Reserve Bank.

The overall size of liabilities is now largely determined by growth in assets, over which the Reserve Bank now exerts a significant degree of control.[5] However, the composition of liabilities remains largely outside of its control, because many of these liabilities remain determined by external factors. For example, during mid 2020, ES balances declined in spite of an overall increase in the size of the balance sheet because the Australian Government increased its deposits at the Reserve Bank. This has partly reversed since late 2020, leading to a decline in government deposits and an increase in ES balances. Separately, growth in the value of banknotes in circulation since the start of the pandemic has replaced around $12 billion in ES balances, as the Reserve Bank deducts balances from commercial banks' ES accounts as payment for these new banknotes (Guttmann *et al* 2021).

Graph 7

Average Residual Maturity



* Repo lending net of borrowing

Source: RBA

Conclusion

In order to support the economy through the pandemic, the Reserve Bank has made significant changes to its monetary policy implementation. A number of new monetary policy tools have been introduced, complemented by the Reserve Bank's existing market operations. The use of this broad range of policy tools has led to a large increase in liquidity in the financial system. At the same time, these policy measures have also changed the size, composition and residual maturity of the Reserve Bank's balance sheet. Reflecting the introduction of the TFF and the Reserve Bank's government bond purchases, the balance sheet has nearly tripled in size since the pandemic – to more than $460 billion or around 23 per cent of GDP – and the residual term to maturity of the Bank's assets has significantly increased. These metrics show that the Reserve Bank's policy measures have provided a significant amount of support to the Australian economy, and will continue to do so for some time.

Footnotes

[*] The authors are from Domestic Markets Department.

[1] For more details on the relationship between the cash rate and other interest rates, see Atkin and La Cava (2017).

[2] For more details on these measures, see Debelle (2020), Kent (2020b) and Lowe (2021).

[3] For more details on the relationship between the Reserve Bank's liabilities and the supply of ES balances, see Robertson (2017).

[4] If the Reserve Bank did not conduct liquidity operations, movements in government deposits and banknotes would not change the size of the Reserve Bank's balance sheet. This is because changes in these liabilities result in an equal and opposite impact on ES balances, such that total liabilities remain unchanged. However, the Reserve Bank's operations kept ES balances relatively stable before the pandemic (by changing the size of its assets). As a result, changes in these other liabilities would directly lead to a change in the size of the Reserve Bank's balance sheet.

[5] The size of the Reserve Bank's balance sheet will also change in response to changes in the market prices of assets held outright, including the prices of longer-term AGS and semis purchased as part of the Reserve Bank's policy actions. Since the balance sheet is measured in Australian dollars, its size will also change in response to movements in foreign exchange rates, which affect the Australian dollar value of the Bank's foreign currency assets.

References

Alston M, S Black, B Jackman and C Schwartz (2020), 'The Term Funding Facility', RBA *Bulletin*, December, viewed 28 April 2021. Available at <https://www.rba.gov.au/publications/bulletin/2020/dec/the-term-funding-facility.html>.

Atkin T and G La Cava (2017), 'The Transmission of Monetary Policy: How Does it Work?', RBA *Bulletin*, September, pp 1–8.

Bank for International Settlements (2020), 'Leverage and Margin Spirals in Fixed Income Markets during the COVID-19 Crisis', BIS Bulletin, 2 April. Available at <https://www.bis.org/publ/bisbull02.pdf>.

Debelle G (2020), 'The Reserve Bank's Policy Actions and Balance Sheet', Address to the Economic Society Australia, Online, 30 June.

Debelle G (2021), 'Monetary Policy during COVID', Shann Memorial Lecture, Online, 6 May.

Domestic Markets Department (2019), 'The Framework for Monetary Policy Implementation in Australia', RBA *Bulletin*, June, viewed 28 April 2021. Available at <https://www.rba.gov.au/publications/bulletin/2019/jun/the-framework-for-monetary-policy-implementation-in-australia.html>.

Guttmann R, C Pavlik, B Ung and G Wang (2021), 'Cash Demand during COVID-19', RBA *Bulletin*, March, viewed 28 April 2021. Available at <https://www.rba.gov.au/publications/bulletin/2021/mar/cash-demand-during-covid-19.html>.

Kent C (2020a), 'The Reserve Bank's Operations – Liquidity, Market Function and Funding', Address to KangaNews, Online, 27 July.

Kent C (2020b), 'The Stance of Monetary Policy in a World of Numerous Tools', Address to the IFR Australia DCM Roundtable Webinar, Online, 20 October.

Lowe P (2021), 'The Year Ahead', Address to National Press Club of Australia, Canberra, 3 February.

RBA (Reserve Bank of Australia) (2020), 'Domestic Financial Conditions', *Statement on Monetary Policy*, May, pp 59–76.

RBA (2021), 'Supporting the Economy and Financial System in Response to COVID-19'. Available at <https://www.rba.gov.au/covid-19/>.

Robertson B (2017), 'Structural Liquidity and Domestic Market Operations', RBA *Bulletin*, September, pp 35–44.

The Committed Liquidity Facility

Andrea Brischetto and Lea Jurkovic[*]

Photo: Busakorn Pongparnit – Getty Images

Abstract

The Reserve Bank provides the Committed Liquidity Facility (CLF) to enhance the resilience of the banking system in times of liquidity stress. Banks need to hold high-quality liquid assets (HQLA), including government securities, as a buffer against liquidity stress. However the low level of government debt in Australia limited the amount they could reasonably hold. The CLF was introduced in 2015 as an alternative. Since 2019, the size of the CLF has been reduced because the amount of government debt on issue has increased significantly. The fee charged for access to the CLF has also been increased to ensure that banks have an incentive to manage their liquidity risk appropriately. The size of the CLF and the associated fee have been adjusted in a measured way to ensure a smooth transition.

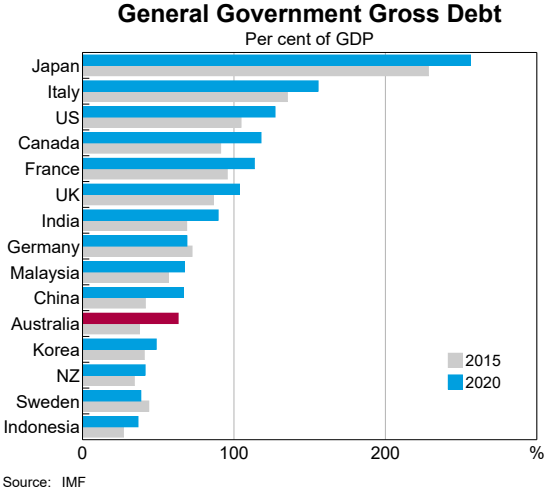
The Committed Liquidity Facility (CLF) is a commitment by the Reserve Bank to provide funds to certain authorised deposit-taking institutions (ADIs or 'banks') in a period of liquidity stress.[1] These funds are secured by high-quality collateral. The Reserve Bank provides the CLF as part of Australia's implementation of the Basel III liquidity standard. This framework has been designed to improve the banking system's resilience to periods of liquidity stress. In particular, the liquidity coverage ratio (LCR) requires banks to have enough high-quality liquid assets (HQLA) to cover their net cash outflows (NCOs) in a 30-day liquidity stress scenario. Under the Basel III liquidity standard, jurisdictions with a clear shortage of domestic-currency HQLA can use other approaches to enable financial institutions to satisfy the LCR. These other approaches include the central bank offering a CLF. A per annum fee is charged based on the size of the Reserve Bank's commitment through the CLF to the LCR bank, regardless of whether the bank draws down on the facility or not. The Australian Prudential Regulation Authority (APRA) is responsible for administering the LCR in Australia, and incorporates the CLF provided by the Reserve Bank.[2]

The CLF was introduced because of the low level of government debt in Australia

HQLA are assets that banks can easily use to cover their short-term liquidity needs. To be considered HQLA, securities need to have a low risk profile (high-quality) and be traded in an active and sizeable market (i.e. they need to be liquid; that is, easily exchanged for cash). The only Australian dollar securities that have been assessed by APRA to be HQLA are Australian Government Securities (AGS) and securities issued by the central borrowing authorities of the states and territories (semis).[3] The only other bank assets recognised as HQLA are liabilities of the Reserve Bank, namely banknotes and surplus Exchange Settlement Account (ESA) balances.[4][5]

Historically, the supply of AGS and semis has not been sufficient for banks to meet the LCR requirement. This reflects the relatively low level of government debt in Australia. Australian Government debt equated to around 40 per cent of GDP when the CLF was introduced in 2015, although it has since risen to be around 65 per cent of GDP at the end of 2020 (Graph 1). In 2015, banks would have had to hold around two-thirds of the value of all AGS and semis outstanding to meet LCR requirements. If banks had held that share of these securities, it would have reduced these securities' market liquidity to the extent that they could no longer be considered HQLA, defeating the purpose of holding them.

Graph 1



Source: IMF

To avoid being required to hold high levels of AGS and semis that would potentially impair the liquidity of these critical markets, banks subject to the LCR requirement were permitted to establish a CLF with the Reserve Bank. Through the CLF, the Reserve Bank makes a commitment to provide liquidity to cover the shortfall between a bank's 'reasonable' holdings of HQLA (i.e. the amount that can be held without impairing market liquidity) and the LCR requirement. Banks can access this committed amount of liquidity should it be required in a period of liquidity stress. Banks pay a fee that is charged on the entire committed amount, regardless of whether it is drawn. High-quality securities are required as collateral to access the CLF.

APRA determines which banks can establish a CLF with the Reserve Bank. Access is limited to those locally incorporated banks that are subject to the LCR requirement. Before establishing a CLF, a bank must apply to APRA for approval, and demonstrate that every reasonable effort has been made to manage liquidity risk independently rather than relying on the CLF. To access the CLF (that is, to draw on CLF funds), a bank must make a formal request to the Reserve Bank that includes an attestation from the CEO that the bank has positive net worth. The bank must also have positive net worth in the opinion of the Reserve Bank. Since the CLF was established, no bank has ever needed to draw on it for liquidity purposes in a period of financial stress.[6]

APRA has recently approved reductions to the size of the CLF …

The total size of the CLF is the difference between the liquidity requirements of CLF banks, and the HQLA securities that the Reserve Bank assesses that CLF banks can 'reasonably' hold to fulfil these requirements without impairing bond market liquidity. The liquidity requirements of individual CLF banks are assessed by APRA. The requirements include an allowance for banks to have buffers over the minimum requirement of covering 100 per cent of their total projected NCOs over a 30-day period. The requirements also take account of banks' projected holdings of other HQLA (banknotes,

Table 1: Reasonable Holdings of HQLA Securities and the Committed Liquidity Facility

$A billion

	Projection of HQLA securities outstanding*	Locally incorporated CLF banks		
		Reasonable holdings of HQLA securities*	LCR requirements*	CLF Amount**
2015	700	175	449	274
2016	780	195	441	246
2017	880	220	437	217
2018	905	226	474	248
2019	898	225	468	243
1 Jan 2020	934	243	466	223
1 Dec 2020	1340	362	550	188
1 February 2021	1488	446	588	142
1 April 2021	1488	446	585	139

Sources: APRA; RBA

* The RBA's 'Projection of HQLA Securities outstanding' and assessment of 'Reasonable holdings of HQLA securities' for the end of the referenced calendar year. 'LCR requirements' refers to APRA's assessment of the aggregate Australian dollar NCOs for the locally incorporated LCR banks at the end of the calendar year, including an allowance for the banks to have buffers over the minimum LCR requirement of 100 per cent; it also takes into account banks' projected holding of banknotes and surplus ESA balances.

** The CLF Amount applying from the start of the referenced calendar year or where a particular date is specified, from that date. 'CLF Amount' is the difference between the LCR requirements and reasonable holdings of HQLA securities.

surplus ESA balances and undrawn Term Funding Facility (TFF) allowances while they are available).

From the introduction of the CLF in 2015 until 2019, APRA adjusted the size of the CLF from the beginning of each calendar year on the basis of estimates of its required size in the year ahead (Table 1). As part of this process, in mid June the Reserve Bank would publish its estimate of reasonable holdings of AGS and semis for December of the following year. APRA would then ask CLF banks to produce a forecast of their Australian dollar-denominated NCOs and HQLA holdings, and thus their requested CLF amount, for the following calendar year. In 2020, however, large changes in the stock of government bonds outstanding and changes in bank funding and liquidity led APRA to adjust the size of the CLF in a number of steps over 2020 and 2021. Overall, the size of the CLF has declined from $274 billion in 2015 to $139 billion in April 2021. Nearly two-thirds of this decline occurred from 1 December 2020.

… because the level of government debt increased following the COVID-19 outbreak …

The significant reduction in the overall size of the CLF from 1 December 2020 reflects, in part, the sharp increase in the stock of AGS and semis outstanding as a result of increased issuance to finance the government's economic support measures in response to the COVID-19 pandemic (Graph 2). The increase in the stock of AGS and semis outstanding has meant that banks could hold more of these securities – both in absolute value and as a share of stock outstanding – without unduly affecting market functioning. Indeed, CLF banks' holdings of HQLA securities increased substantially over 2020, with increases in holdings of both AGS and semis during the year, although only semis holdings remained higher at the end of 2020 (Graph 3). As a result, the size of the CLF required to cover the shortfall between banks' holdings of HQLA and their LCR requirements declined.

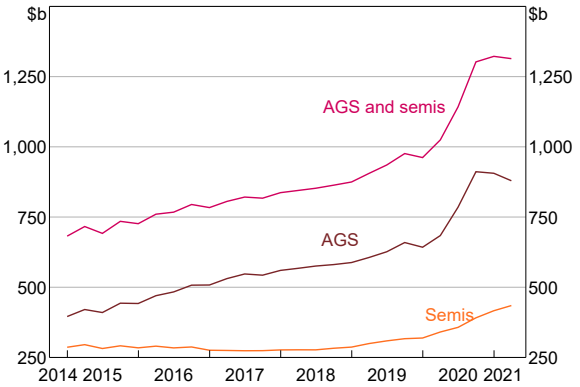
From 2015 to 2019, the Reserve Bank had assessed that CLF banks could reasonably hold 25 per cent of the stock of AGS and semis outstanding. Following a review of the CLF in 2019, the Reserve Bank had assessed that the share of the stock of HQLA securities that could be reasonably held by CLF banks could increase at a pace of 1 percentage point per year from 25 per cent in 2019 to 30 per cent in 2024. This reflected the increase in the stock of AGS and semis outstanding over time, as well as the fact that they had become more readily available in the market.[7]

Following the sharp increase in the stock of AGS and semis outstanding in 2020, however, the Reserve Bank assessed that the increase in the share of AGS and semis that banks could reasonably hold could occur more quickly. The Reserve Bank assessed that the share of the stock of HQLA securities that could be reasonably held by CLF banks could increase from 26 to 27 per cent of the stock outstanding by the end of 2020, and from 27 to 30 per cent of the stock outstanding by the end of 2021.[8]

Graph 2

AUD HQLA Securities Outstanding

Market value

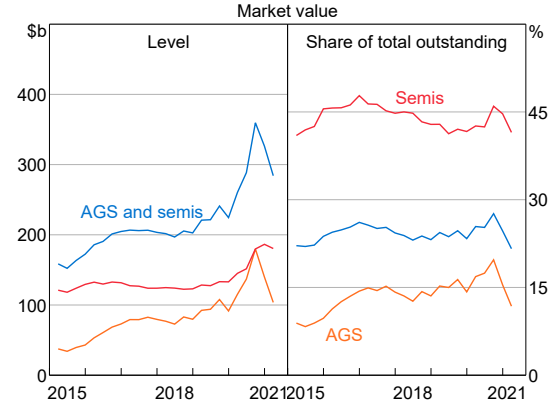


Sources: ABS; AOFM; Comonwealth and state treasuries; RBA

Graph 3

CLF Banks' Holdings of AUD HQLA Securities

Market value



Sources: AOFM; APRA; Commonwealth and state treasuries; RBA

… and because of improvements in funding and liquidity conditions for banks

The reduction in the CLF was also facilitated by improvements in funding and liquidity conditions for banks, where CLF banks were comfortably exceeding their LCR requirements. The policy measures implemented by the Reserve Bank to cushion the Australian economy from the effects of the COVID-19 crisis contributed to the improvement in liquidity conditions in the banking system and lower funding costs across the economy.

Surplus ESA balances held with the Reserve Bank, which are a form of HQLA, have also risen substantially since early 2020 (Graph 4). Funding provided by the Reserve Bank under the TFF has contributed to the rise in ESA balances. The Reserve Bank's purchases of government bonds to support the 3-year Australian Government bond yield target, to aid market functioning, and as part of the Bond Purchase Program (BPP) have also contributed to higher surplus ESA balances.[9] The rise in surplus ESA balances, all else being equal, implies less need for the CLF. However, it is important to note that the level of ESA balances will continue to depend on (and change with) monetary policy developments. Indeed, given the generally uncertain environment in 2020, APRA took a measured approach to reducing the size of the CLF for 2021 (see below).

Since November 2020, the Reserve Bank's bond purchases through the BPP have contributed to the increase in ESA balances (Graph 5). Some of these bonds have been purchased from CLF banks, as reflected in the decline in CLF banks' holdings of AGS and semis since late 2020. When the Reserve Bank buys bonds from a bank, it pays for the bonds by crediting that bank's ESA. In other words, one type of HQLA is swapped for another, and the level of HQLA held by the bank stays the same.

At the same time that there has been a large increase in available HQLA over the past year, banks' liquidity needs have increased, owing to a sharp increase in bank deposits over 2020. The increase in deposits has been associated with an increase in NCOs under the LCR scenario, thereby increasing the amount of HQLA required to be held under the LCR requirement (Graph 6). The increase in CLF banks' holdings of HQLA was even larger, however, resulting in the reductions in the required size of the CLF.

Reductions to the CLF have been made in measured steps

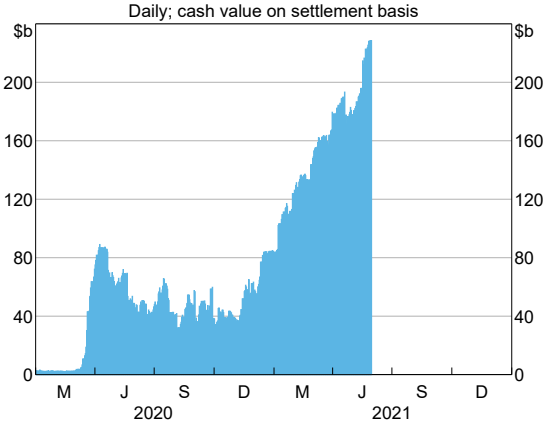
To help banks manage their LCRs in light of the changes in HQLA and NCOs in 2020, APRA allowed CLF banks to apply for interim adjustments to CLF allowances, in addition to the usual annual review process. The overall CLF was accordingly reduced by $35 billion on 1 December 2020, by $46 billion on 1 February 2021, and by a further $3 billion on 1 April 2021 (Graph 7). The CLF now stands at $139 billion, compared with $243 billion in 2019.

APRA has ensured that changes to the CLF continue to be made in a measured way to avoid financial market disruptions. With a smaller-sized CLF, banks need to hold less assets to collateralise their CLF allowances. An overly rapid adjustment to banks' asset holdings has the potential to be disruptive for

Graph 4

Exchange Settlement Balances

Daily; cash value on settlement basis

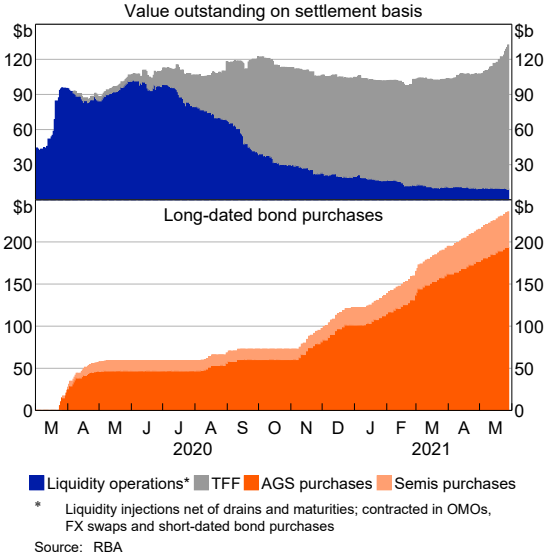


Source: RBA

Graph 5

Monetary Policy Operations

Value outstanding on settlement basis



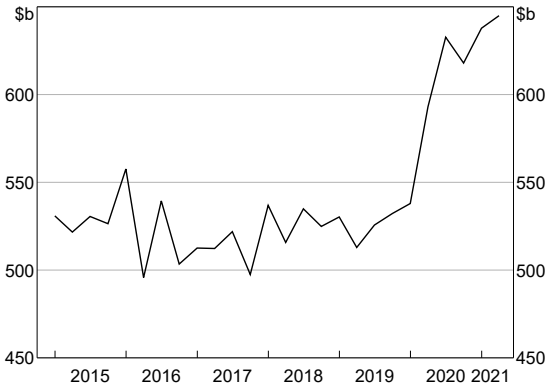
* Liquidity injections net of drains and maturities; contracted in OMOs, FX swaps and short-dated bond purchases

Source: RBA

Graph 6

Net Cash Outflows

CLF Banks

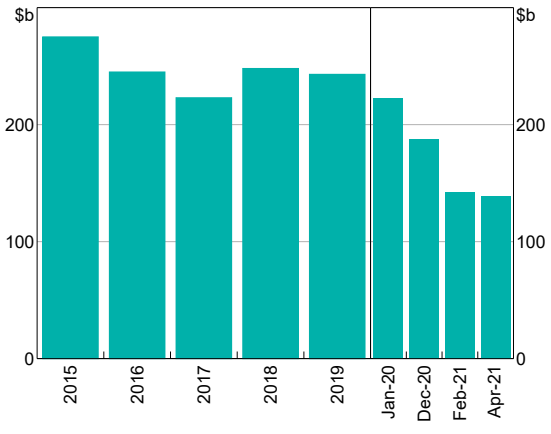


Sources: APRA; RBA

Graph 7

Committed Liquidity Facility

Amount



Sources: APRA; RBA

both the banks involved and the markets for these assets. A measured approach to reducing the size of the CLF was also considered appropriate given the uncertain economic environment following the COVID-19 pandemic; the conditions facing banks and the amount of HQLA had changed rapidly over 2020. Accordingly, in calculating the size of the CLF for 2021, APRA assumed CLF banks' surplus ESA balances would be around the (significantly lower) levels of previous years when calculating the size of the CLF for 2021.

The CLF fee has also recently been increased

For a commitment under the CLF, the CLF banks must pay a monthly fee to the Reserve Bank. This fee is charged on the entire committed amount, regardless of whether or not the LCR bank draws down on the CLF over that period. (In the event of a drawing on the CLF, in addition to the set fee, interest would be charged on the amount drawn.) The Reserve Bank aims to set the level of the CLF fee such that banks face similar financial incentives when holding additional HQLA securities or applying for a higher CLF in order to satisfy their liquidity requirements. From 2015 to 2019, the Reserve Bank charged a CLF fee of 15 basis points per annum on the commitment to each bank. Following the 2019 review of the CLF, the CLF fee was increased in 2 steps, to 17 basis points per annum on 1 January 2020 and to 20 basis points per annum on 1 January 2021. This increase was judged appropriate to provide banks with an incentive to manage their liquidity risk appropriately. The fee increase was implemented in 2 steps to ensure a smooth transition by minimising the effect on market functioning. See Bergmann, Connolly and Muscatello (2019) for further details.

Conclusion

Since 2019, the size of the CLF has been reduced substantially because of the increased availability of HQLA and improvements in funding and liquidity conditions for banks. The increased issuance of AGS and semis in order to fund the fiscal responses to the COVID-19 pandemic has meant that CLF banks are able to hold a larger amount of AGS and semis – both in terms of value and the share of issuance – without unduly affecting market functioning. The Reserve Bank has assessed that CLF banks can reasonably hold 30 per cent of the stock of HQLA securities outstanding by the end of 2021. Given this, and APRA's assessment of both the liquidity requirements of CLF banks and their funding and liquidity conditions, the CLF was reduced to $139 billion in April 2021, down from $243 billion in 2019. This reduction was made in measured steps over 2020 and 2021, given the rapidly changing and uncertain environment and to allow banks time to adjust as required. The CLF fee has also been increased since 2019, following a review by the Reserve Bank, to provide banks with an incentive to manage their liquidity risk appropriately. The fee was increased in increments – from 15 basis points in 2019 to 17 basis points in 2020 and to 20 basis points in 2021 – to ensure a smooth transition.

Footnotes

[*] The authors are from Domestic Markets Department.

[1] See BCBS (2013); for more information about the introduction of the CLF, see Debelle (2011)

[2] See APRA (2018)

[3] See APRA (2020)

[4] A portion of the balances held by financial institutions in their ESAs at the Reserve Bank arise from 'open repos' (see footnote 6). The remainder of ESA balances are referred to as surplus ESA balances.

[5] From 31 March 2020, if banks held sufficient available and eligible collateral, APRA also allowed banks to treat available, undrawn Term Funding Facility (TFF) allowances as liquid assets to meet LCR requirements. These allowances, and the ability to count them as liquid assets, are scheduled to expire on 30 June 2021.

[6] Some banks have technically drawn on the CLF, since any usage of the Reserve Bank's standing facilities by a CLF bank is considered to be a drawing on their CLF. In particular, some banks maintain 'open repos' (repurchase agreements contracted without a maturity date) with the Reserve Bank to support the smooth functioning of the payments system. The funds obtained via these open repos are held in the banks' ESAs for use in meeting their payment obligations after normal banking hours, such as from transactions through the New Payments Platform.

These open repos have averaged around $25 billion over the past 6 years, and account for virtually all of the usage of the CLF over this period. The remaining usage of the CLF has been for small transactions used to test banks' systems and access.

[7] See Bergmann, Connolly and Muscatello (2019).

[8] See RBA (2020).

[9] In the early stages of the pandemic, the additional provision of liquidity via the Reserve Bank's daily open market operations also contributed to the rise in ESA balances, though this was a temporary boost which has since been reversed.

References

Alston A, S Black, B Jackman and C Schwartz (2020), 'The Term Funding Facility', RBA *Bulletin*, December, viewed 7 May 2021. Available at <https://www.rba.gov.au/publications/bulletin/2020/dec/the-term-funding-facility.html>

APRA (Australian Prudential Regulation Authority) (2018), Prudential Standard APS 210 Liquidity, January.

APRA (2020), Liquidity - frequently asked questions. Available at <https://www.apra.gov.au/liquidity-frequently-asked-questions>

BCBS (Basel Committee on Banking Supervision) (2013), *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*, January.

Bergmann M, E Connolly and J Muscatello (2019), 'The Committed Liquidity Facility', RBA *Bulletin,* September. Viewed 7 May 2021. Available at <https://www.rba.gov.au/publications/bulletin/2019/sep/the-committed-liquidity-facility.html>

Debelle G (2011), 'The Committed Liquidity Facility', speech to the APRA Basel III Implementation Workshop 2011, 23 November.

RBA (Reserve Bank of Australia) (2019), 'Reserve Bank Adjusts the Committed Liquidity Facility', June.

RBA (2020), 'Committed Liquidity Facility', 20 November. Committed Liquidity Facility | Media Releases | RBA

Corporate Bonds in the Reserve Bank's Collateral Framework

Jin Lim, Eva Liu, Nathan Walsh, Andrew Zanchetta and Duke Cole[*]

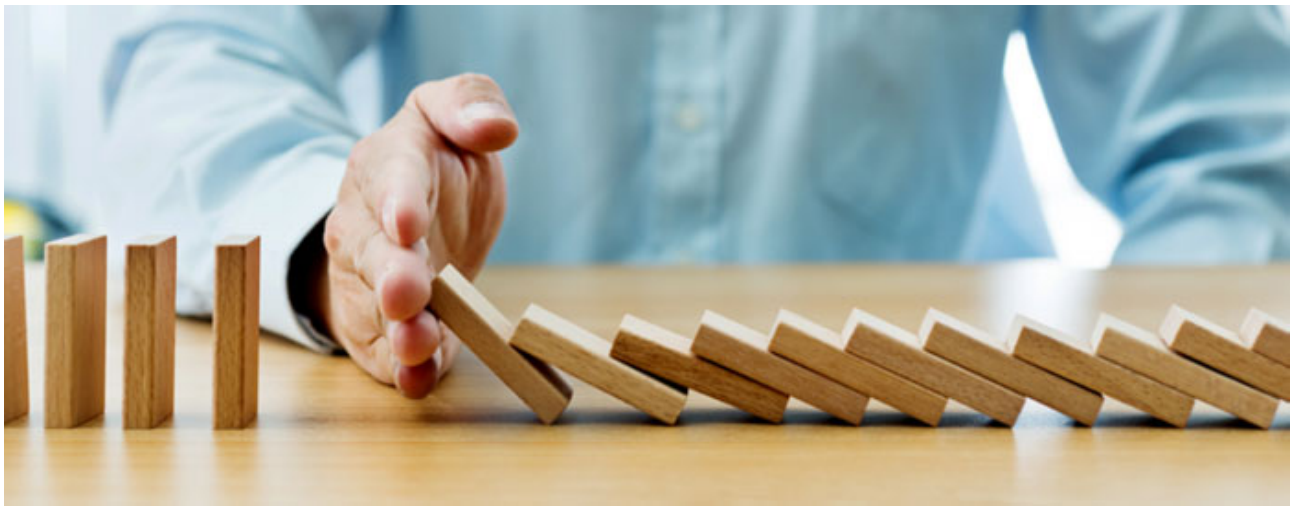


Photo: Baona – Getty Images

Abstract

In May 2020, the Reserve Bank broadened the range of corporate bonds accepted as collateral under repurchase agreements (repo) from AAA-rated to investment grade (BBB- or above). This change in policy increased the universe of potentially eligible securities for domestic market operations by around $150 billion, of which the Reserve Bank has received applications for and granted eligibility to around $50 billion. In assessing applications for repo eligibility, a number of features – including subordination, embedded options and legal risks – required further investigation to ensure the securities remained within the Bank's risk appetite. Corporate securities remain a small share of total eligible collateral. While usage of corporate bonds in repos with the Bank has been relatively modest to date, the policy change to broaden may have provided some support to the Australian corporate bond market.

Expanding repo eligibility to investment-grade corporate bonds

Repurchase agreements (repos) are used by the Bank in its domestic market operations to implement monetary policy, support the smooth functioning of the payments system, and to provide liquidity during times of financial system stress to promote financial stability and support the supply of credit. Repos are a form of secured lending where liquidity is provided to counterparties in exchange for collateral (i.e. securities). On 5 May 2020, the Reserve Bank broadened the range of corporate bonds accepted as collateral under repos from AAA-rated to investment grade (BBB- or above) (RBA 2020). Corporate bonds include securities issued by companies as well as those issued by entities established under an Australian Government, state or territory law, such as universities.[1] This policy change aligned the credit rating requirement for corporate securities with that for authorised

deposit-taking institutions (ADIs – hereafter referred to as banks), whose investment-grade securities have been eligible since 2012 (RBA 2011).

This broadening of the collateral framework added around $150 billion to the value of potentially eligible securities. Based on over 200 repo eligibility applications received from market participants to the end of March 2021, the Bank has granted repo eligibility to corporate bonds valued at more than $50 billion (Graph 1). This compares to around $2.5 trillion in total eligible securities currently outstanding.

The policy change sought to support liquidity in the corporate bond market after financial market conditions tightened with the onset of the COVID-19 pandemic. This was one element of the Bank's wide-ranging policy response to the pandemic (RBA 2021). At the margin, broadening repo eligibility may increase the attractiveness of corporate bonds to investors and therefore support corporate bond issuance and market liquidity. This is because corporate bonds can be used as collateral by eligible counterparties to access liquidity from the Reserve Bank, which may make it easier to fund holdings of those securities, as well as potentially expand the pool of investors willing to hold eligible corporate bonds.

The policy case to broaden the collateral framework was balanced against the financial risk the Bank might incur, which in practice is low for repos. The securities posted as collateral protect the Bank against financial loss if a counterparty defaults on a repo (Naghiloo and Olivan 2017). The Bank would make a loss only if a counterparty failed to repurchase securities sold to the Bank under repo and the market value of the securities fell below the agreed repurchase amount. To manage the risk of the security value falling below the repurchase amount, the Bank:

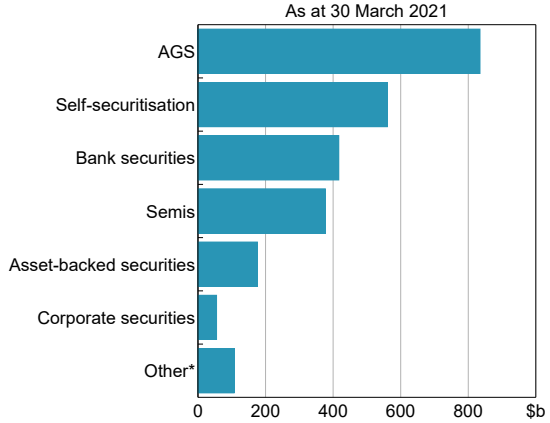
- assesses the securities to ensure they meet minimum eligibility criteria, including creditworthiness;
- applies a margin to each security posted as collateral, by requiring more securities to be provided than the amount of liquidity provided under repo; and
- revalues the securities each day and, subject to market movements, requests additional collateral (i.e. makes margin calls) to maintain sufficient collateralisation.

The margin ratio framework applicable to repo-eligible corporate securities was aligned with the framework that applies to securities issued by ADIs.[2] Margin ratios applied by the Bank for different types of securities are determined based on their credit and liquidity risks. It was judged that the risks associated with corporate securities are, on average, no higher than for debt issued by banks. Some international research suggests that for a given credit rating, non-financial corporate debt is on average less risky than bank debt (that is, the corporate issuer is less likely to default than a bank issuer with the same credit rating).[3] Reflecting this, some central banks such as the European Central Bank (ECB), US Federal Reserve (Fed) and Bank of England (BoE) have collateral frameworks that apply less onerous eligibility standards and/or lower margin ratios to corporate debt than for bank debt.[4] However, the Australian corporate bond market is less developed than in the United States and Europe, which implies a higher level of liquidity risk for Australian corporate bonds compared to corporate debt issued in other international markets.

Graph 1

Outstanding Eligible Securities

As at 30 March 2021



* Other includes supranational debt, securities with government guarantee and other-AAA rated securities

Sources: Bloomberg; Exigo; RBA

Table 1: Corporate Bonds Assessed as Ineligible[(a)]

May 2020 to March 2021

Reason	Number of bonds	Issuance volume (A$b)	Number of issuers
Structurally subordinated	7	3.2	4
Incomplete application	1	0.3	1
Application withdrawn	2	0.9	1
Limited events of default	3	0.9	2
Not directly issued in Austraclear	2	1.4	2
Issuer domiciled in a tax haven	6	0.9	2
Not enough credit ratings	1	0.2	1

(a) Securities are assessed individually; other securities issued by the entities listed may meet the Bank's eligibility criteria. The Bank does not assess eligibility until it has received a complete application for a given security.

Source: RBA

Assessing corporate bonds for repo eligibility

The Reserve Bank assesses securities against its eligibility criteria before they can be posted as collateral in repos. Some corporate bonds contain features that may pose elevated risks to the Bank, or would otherwise not support the Bank's policy objectives, and these can be grounds to reject applications for repo eligibility. This section explores 3 of these features:

- Subordination
- Embedded options
- Foreign issuers

In most cases, the Bank has assessed that the risks that might arise from investment-grade corporate bonds are within the Bank's risk tolerance. Of the more than 200 applications received since May 2020, 183 securities from 74 different issuers were approved, while the Bank rejected 21 securities from 13 issuers which did not meet the Bank's eligibility criteria as explained further below (Graph 2, Table 1).

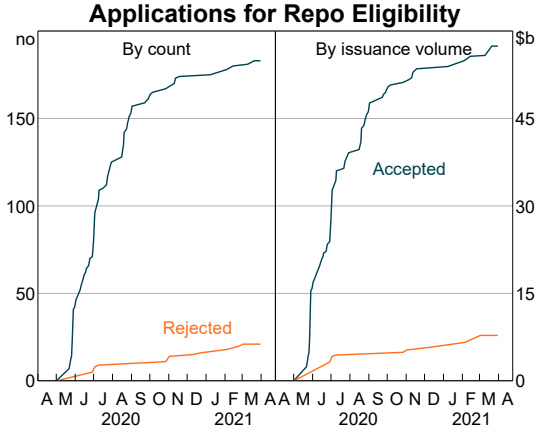
Eligible corporate bonds must be unsubordinated

The Bank requires eligible securities to be direct and unsubordinated obligations of the issuer which rank at least equally with all other unsubordinated and unsecured obligations of the issuer. This means that, in the event the issuer defaults on its liabilities (for example by failing to meet interest payments), the holders of eligible securities have equal and first claim among unsecured creditors. There are a number of circumstances where bonds may be subordinated, subordination is unclear, or investors have fewer rights than for other securities by the issuer:

- **Structural subordination** exists where senior unsubordinated securities are issued by a holding company who in turn owns operating subsidiaries that also issue securities. The holding company's securities are subordinated to that of each subsidiary, because each subsidiary pays its bondholders before the holding company. The Bank has received 7 applications for structurally subordinated securities, all of which were rejected.
- **Complicated corporate and trust structures**. In some cases, other entities in a group

Graph 2

Corporate Bonds - Applications for Repo Eligibility



Sources: Bloomberg; Exigo; RBA

corporate structure may guarantee the issuer's obligations, supporting the ongoing payment of cash flows from securities. Guarantors are more common where the corporate structure is complex, such as utility and infrastructure companies and real estate investment trusts. The Bank is comfortable accepting securities with guarantors, where it can identify that the securities are senior and unsubordinated obligations of the issuer and all guarantors.

- **Foreign banks and resolution regimes.** More debt issued by foreign banks is now eligible for repo. Previously, only securities issued by foreign banks with an Australian presence (such as a branch or subsidiary) could be made eligible. As part of resolution planning, jurisdictions have introduced statutory powers or other rules that may affect how debt is treated in the event a bank is resolved (FSB 2015). These rules vary by jurisdiction. The Bank does accept securities under repo even if they could be 'bailed in' (that is, converted to equity to support a bank's resolution), but only if they are not bailed in before other unsecured debt securities of the issuer.

  Some jurisdictions require structural subordination described above to create subordinated debt that would be bailed in before other unsecured debt securities, while others expect banks to issue subordinated 'senior non-preferred' securities that would be bailed in before other unsecured debt securities. Senior non-preferred securities are not eligible. Most foreign bank securities assessed to date have been made eligible. In a small number of cases, the Bank has identified securities where limited events of default apply for one class of senior unsecured notes but not another. Although they might be ranked equally (as senior unsecured obligations), the securities with limited events of default have fewer rights than those with full events of default. The Bank rejected the securities with limited events of default.

Embedded options do not present much additional risk to the Reserve Bank

Unlike currently eligible government, bank and supranational bonds, many corporate bonds have embedded call or put options. To date, the Reserve Bank has accepted all applications it has received for corporate bonds with embedded options because the risk to the Reserve Bank is judged to be relatively small. However, the Reserve Bank continues to assess each new type of embedded option to ensure this remains the case.

An embedded call option gives the issuer the right but not the obligation to redeem notes before their maturity date. They allow issuers to refinance bonds early which mitigates the risk of not being able to roll over existing debt and provides flexibility to change the entity's financial structure. However, the Reserve Bank faces the risk that the redemption price (if the call option is exercised) is lower than the market price of that security (prior to notification that the call option is being exercised) and this price difference is not covered by over collateralisation (i.e. the margin). If this occurred at the same time as a counterparty defaulted, the Reserve Bank may make a loss.

There are 3 common types of call options found in corporate bonds:

- **Par calls.** A par call allows the issuer to redeem a bond at the outstanding principal amount (i.e. par), usually in the last 3, 6 or 12 months of a bond's term.
- **Make-whole calls.** A make-whole call allows the issuer to redeem a bond at the greater of the net present value of the bond's remaining cash flows or the par value of the security. The net present value is calculated by discounting cash flows using a discount rate equal to a risk-free rate plus a risk premium specified in the issuance documentation. The issuer can typically exercise these calls at any time during the term of the bond.
- **Tax or event-driven calls.** The issuer can redeem the bond (usually at par) if a specific event occurs. These events include an increase in coupon payments due to a change in tax rules (such as a change in non-resident

withholding tax), a change of control for the issuer or guarantors, or if a specified portion of notes on issue has already previously been redeemed. Tax-based calls are quite common across other security types as well.

Most eligible corporate bonds have at least one type of option, with the 2 most common options being a tax call and a par call. The probability of a tax call being exercised and the associated risk is very low. The Reserve Bank also faces almost no risk from par calls because during the period the call can be exercised the securities are priced at the lower of par, or the net present value of the security's outstanding cash flows until maturity.

Eligible corporate bonds also have embedded make-whole calls. A make-whole call is structured such that the issuer's call is designed to be 'out of the money'; that is, the make-whole price is higher than the current market price. As the Reserve Bank receives the higher make-whole price if the call is exercised, the risk of loss to the Reserve Bank is low. Further, issuers are unlikely to exercise this call option purely to take advantage of cheaper financing rates (because lower interest rates increase the make-whole price, which is the cost of redeeming the existing debt).[5] The Reserve Bank mitigates any residual risk from embedded call options by requiring counterparties to substitute alternative eligible collateral if a call notice has been issued for a corporate security held under repo.

In contrast to embedded call options, an embedded put option reduces the noteholders' risk of holding a security by giving them the right, but not the obligation to redeem notes early when a trigger event occurs. These triggers tend to be change of control events, including where the change causes a credit rating to be withdrawn or downgraded. The Reserve Bank faces no additional market risk from a put option in a security it holds under repo.

The Reserve Bank does not accept bonds from domiciles that present risks outside its appetite

Prior to the broadening of the collateral framework in May 2020, 134 securities from foreign issuers in 10 countries were repo eligible (Graph 3). Since the policy announcement, the Reserve Bank has granted eligibility to an additional 54 securities from foreign issuers, including for the first time issuers from New Zealand, South Korea, the United Arab Emirates, the United Kingdom and France.

The Reserve Bank does not accept securities from domiciles that represent risks outside its appetite, including because they may pose elevated money laundering, terrorism financing or tax evasion risks. The Reserve Bank has rejected 6 securities because the issuers were domiciled in a tax haven. The Reserve Bank conducts regular checks for domiciles and issuers for these elevated risks, as well as any sanctions that might apply to foreign issuers.

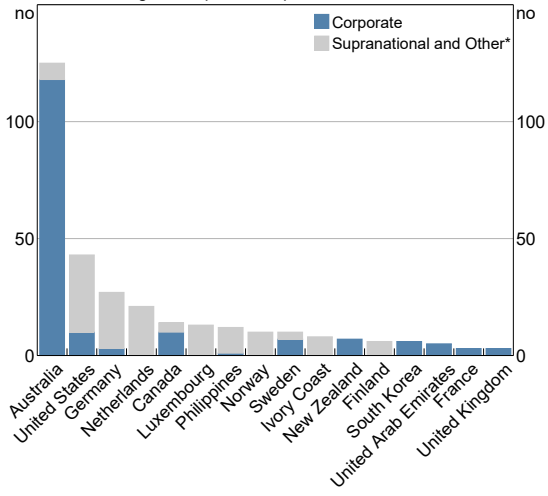
Corporate bonds since the policy change

Corporate bonds now make up around 2 per cent of outstanding eligible securities. However, the share of the Reserve Bank's domestic repo portfolio collateralised by corporate bonds since the policy change peaked in August 2020 at just 0.4 per cent ($100 million) (Graph 4). This share has remained very small as the Reserve Bank's domestic repo portfolio is primarily collateralised by self-securitisations, Australian Government Securities (AGS) and semi-government securities (Graph 5). Self-securitisations are structured pools of assets, such as residential mortgages, created by banks specifically to use as collateral to access liquidity from the Reserve Bank. Use of self-securitisations

Graph 3

Country of Domicile

Issuer of eligible corporate, supranational and other bonds



* Other bonds include securities issued by certain foreign entities that are not corporations and entities with a government guarantee.

Sources: RBA; Reuters

has increased significantly as they are permitted to be used as collateral to access liquidity under the Term Funding Facility (TFF), introduced in March 2020, and are the cheapest form of collateral (Cole and de Roure 2020).

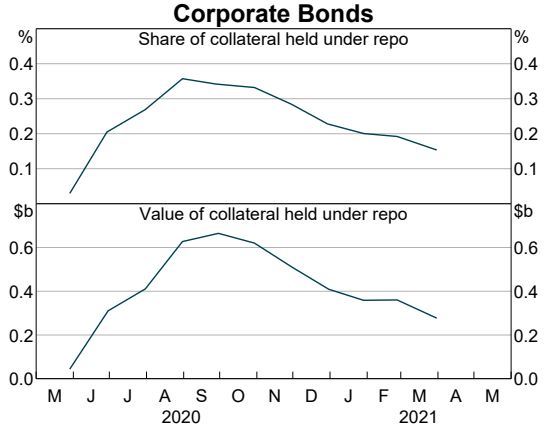
While corporate bonds are a small share of all collateral posted, more than half of repo-eligible corporate bonds have been used as collateral at least once since the policy change. These are typically small parcels of less than $10 million. The majority of these securities have been posted through triparty repo, where the collateral for a repo is managed by a third party, ASX Collateral (for more information on triparty repo, see Naghiloo and Olivan 2017). There is generally frequent turnover of securities held as collateral in triparty repos because substitutions (i.e. changes to securities that collateralise a repo) are optimised based on which securities are the cheapest for the counterparty to use as collateral.

As noted above, broadening repo eligibility of corporate bonds may have indirect effects on the market for these bonds such as increased issuance and price differentiation (i.e. an 'eligibility premium' may emerge for repo-eligible securities (BIS 2015)).[6]

Isolating the effect of the change in repo eligibility policy on corporate bond yields and issuance is challenging due to the highly volatile market conditions at the time, as well as other policy actions by governments and central banks. For example, low-cost funding provided by the Reserve Bank to banks under the TFF reduced the need for banks to issue bonds, in turn placing downward pressure on bank bond yields (Alston *et al* 2020). The spread between investment-grade corporate bond yields and major bank bond yields actually widened, as bank bond yields fell more quickly (Graph 6). Corporate bond yields have since fallen to below pre-COVID levels, as interest rates have fallen globally and market dislocation receded (RBA 2020), but the spread to major bank bond yields remains a little wider than pre-pandemic levels. Issuance picked up in the June and September quarters of 2020, but subsequently returned to around long-term average levels as the increase in activity at the height of market instability subsided (Graph 7).

Graph 4

Corporate Bonds

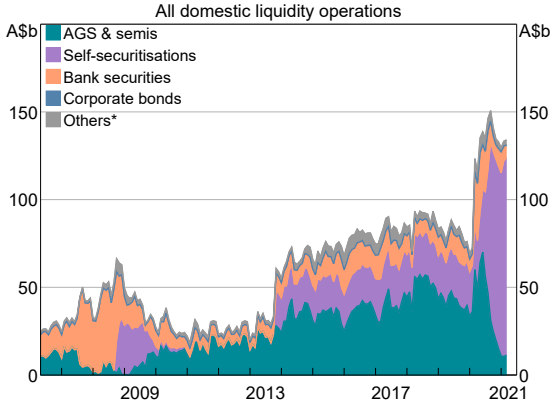


Source: RBA

Graph 5

Collateral Held Under Repo

All domestic liquidity operations



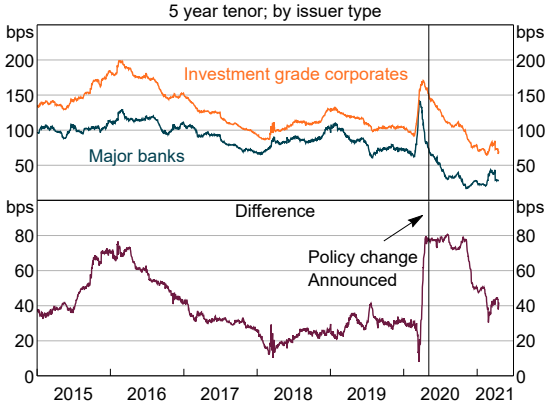
* Others include asset-backed securities, supranational debt, securities with government guarantees and other AAA securities

Source: RBA

Graph 6

Corporate Bond Spreads to AGS

5 year tenor; by issuer type



Sources: Bloomberg; RBA

Characteristics of eligible corporate bonds

Typically issuers or the Bank's counterparties submit applications for securities to be assessed for repo eligibility, although there are no restrictions on who can apply. The corporate bonds that have been approved as repo eligible are generally representative of the market across different credit ratings (Graph 8).

Issuers of repo-eligible corporate bonds span a wide range of industries (Graph 9). More than half of eligible corporate securities are issued by financial firms, including non-bank lenders, foreign banks, insurance companies and corporate finance companies. Corporate finance companies include subsidiaries that raise funds on behalf of companies in industries such as electricity, telecommunications or retail. The full list of eligible securities is available on the Bank's website.

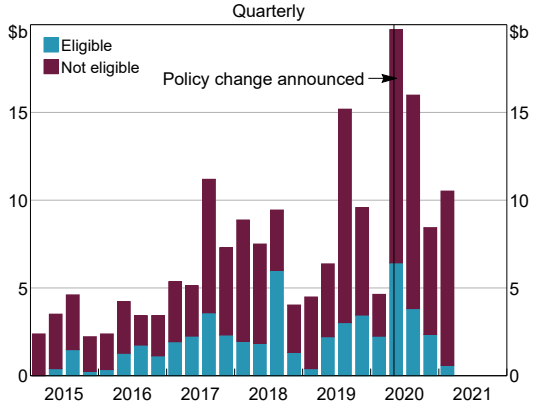
Conclusion

Expansion of the Bank's repo eligibility framework to include investment-grade corporate bonds has increased the amount of collateral potentially available for repos with the Bank. While usage of corporate bonds in repos with the Bank has been relatively modest to date, this policy change may have provided some support to the Australian corporate bond market. However, isolating its impact from other monetary policy measures implemented to support the economy is difficult. Regardless, the additional risk to the Bank from accepting these bonds is very small.

Graph 7

Corporate Bonds Issuance

Quarterly

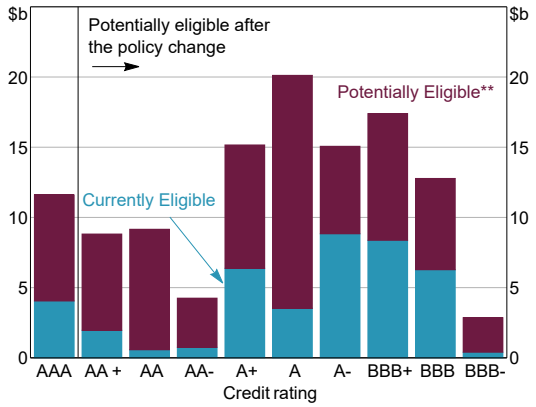


Sources: Bloomberg; RBA

Graph 8

Outstanding Corporate Bonds*

as at 31 March 2021



* Only corporate bonds that have ratings available are included

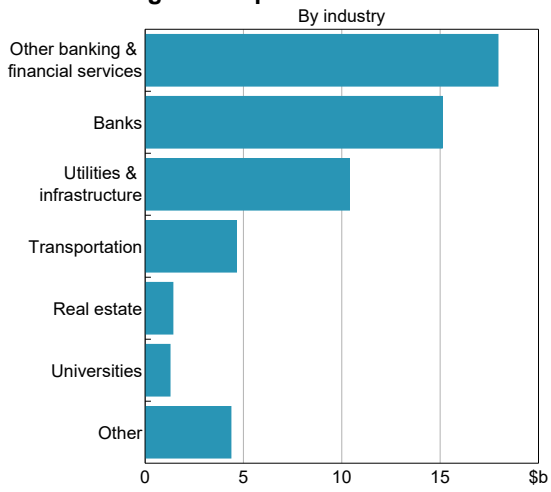
** Potentially eligible securities have not been assessed by the Bank, and may not meet all eligibility criteria

Sources: RBA; Reuters

Graph 9

Eligible Corporate Bonds Outstanding

By industry



Sources: RBA; Reuters

Footnotes

[*] The authors are from Risk and Compliance Department. They would like to thank Calebe de Roure and Michael Reschke, who also assessed a large number of corporate bonds following the policy announcement while in Risk and Compliance Department.

[1] A security is classified as a non-ADI corporate bond if the issuer is incorporated under the Corporations Act or equivalently incorporated in a foreign jurisdiction. This does not include securities issued by foreign governments, foreign government-established entities, or supranational entities.

[2] Refer Margin Ratios.

[3] For example, Cornaggia, Cornaggia and Hund (2017) show that: (i) the default frequency of bank debt is, on average, higher than corporate debt at a given credit rating; and (ii) rating transition statistics (i.e. downgrades/upgrades) are no different for bank and corporate debt.

[4] The Fed and ECB apply higher margins to bank debt, while the BoE does not accept the debt of financial institutions as collateral, yet it accepts corporate debt.

[5] As the discount rate used to calculate the net present value of cash flows is a floating rate plus a risk premium, the net present value moves inversely with interest rates.

[6] An eligibility premium might emerge if the demand for eligible bonds is higher than for ineligible bonds, which would increase the price of eligible bonds, reducing their yields. Internationally there is some evidence for this (Corradin and Rodriguez-Moreno 2016).

References

Alston M, Black S, Jackman B and Schwartz C (2020), The Term Funding Facility, *RBA Bulletin,* December, viewed 3 May 2021. Available at https://www.rba.gov.au/publications/bulletin/2020/dec/the-term-funding-facility.html#fn2.

BIS (Bank for International Settlements) (2015), Central bank operating frameworks and collateral markets, Committee on the Global Financial System Papers, No 53.

Cole D and C de Roure (2020), Managing the risks of holding self-securitisation as collateral, *RBA Bulletin*, September, viewed 3 May 2021. Available at https://www.rba.gov.au/publications/bulletin/2020/sep/managing-the-risks-of-holding-self-securitisations-as-collateral.html

Corradin S and M Rodriguez-Moreno (2016), Violating the law of one price: the role of non-conventional monetary policy, Working Paper Series, No 1927.

Cornaggia, Cornaggia and Hund (2017), Credit ratings across asset classes: a long-term perspective, *Review of Finance*, 21 (2) pp 465–509.

FSB (Financial Stability Board) (2015), Principles on Loss-absorbing and Recapitalisation of G-SIBs in Resolution, 9 November.

Naghiloo Y and D Olivan (2017), The Reserve Bank's collateral framework, *RBA Bulletin*, December Quarter.

RBA (Reserve Bank of Australia) (2011), Changes to eligible securities and margining for domestic market operations, *Media release*, 16 November.

RBA (2020), Broadening eligibility of corporate debt securities as collateral for domestic market operations, *Announcement*, 5 May. Accessed 3 May 2021.

RBA (2021), Supporting the economy and financial system in response to COVID-19. Accessed 5 May 2021.

Review of the NGB Upgrade Program

Kate Hickie, Kathryn Miegel and Matthew Tsikrikas[*]

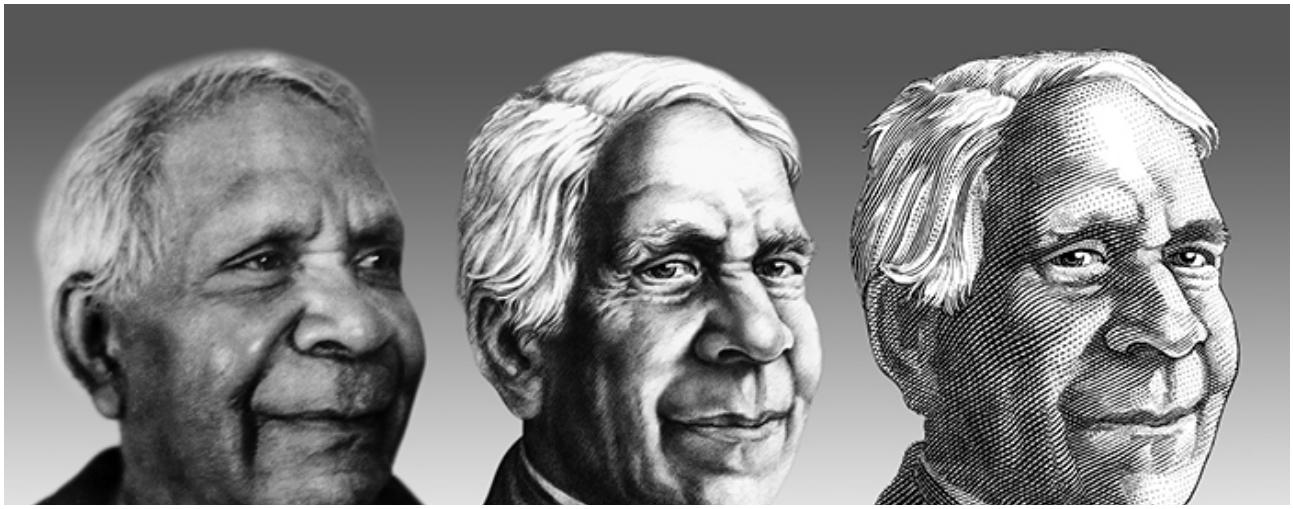


Photo: (Left to Right) State Library of South Australia, B 7326; RBA Archives, 18/4741, P12/256

Abstract

A key responsibility of the Reserve Bank is to maintain public confidence in Australia's banknotes as a secure method of payment and store of wealth. To help achieve this objective the Bank initiated the Next Generation Banknote (NGB) program, which involved the design and development of a new banknote series to make Australia's banknotes more secure from counterfeiting. The decade-long program concluded in late 2020, with the release of the final upgraded banknote into general circulation. The program delivered a suite of new Australian banknotes with a range of new innovative security features. Overall the banknotes have been well received by the general public and counterfeiting rates have remained low.

Introduction

Australia has a tradition of developing and introducing technologically advanced security features for banknotes. Most notably, Australia was the first country in the world to successfully use polymer as the production material (or substrate) for an entire series of banknotes. The use of polymer created substantially more secure banknotes, which were much harder for counterfeiters to replicate convincingly than was the case for paper banknotes. However, after nearly 25 years, the security of Australia's banknotes needed to be upgraded and so the Reserve Bank undertook the NGB program.

Overview of the NGB program

While the use of polymer helped ensure that Australia's counterfeiting rates remained low, by the mid 2000s an increasing availability of fairly high-quality reproduction technology began to make Australia's first series of polymer banknotes more vulnerable to counterfeiting. (See 'Box A: Australia's Counterfeiting Landscape' for more information on counterfeiting trends). In response to the increasing threat from counterfeiting, the Reserve Bank established the NGB program. The purpose of the program was to upgrade the security of Australia's banknotes to ensure that they continued to be secure against counterfeiting.

The NGB program was publicly announced in 2012 and involved upgrading the entire series of Australian banknotes. The program involved developing banknote designs with new security features, which required a considerable amount of work.[1] For instance, the Reserve Bank considered the security benefits and function of more than 200 security features before deciding on the new features that would be included on the upgraded banknote series. The NGB program also involved extensive consultation with stakeholders – including members of the cash handling industry, the vision-impaired community and the public more generally – to ensure that the new banknotes would continue to meet community needs.[2] The program concluded in October 2020 when the $100 banknote – the final denomination to be redesigned as part of the NGB program – entered general circulation.

Key results of the NGB program

The NGB program was a highly complex, long-running and ultimately very successful project. Of particular note, the program delivered an upgraded polymer banknote series that retains many of the key design elements of the first polymer banknote series – including the colour, size and people portrayed – but also has a range of innovative new security features (Figure 1).[3] As a result, the upgraded banknote series is significantly more secure from counterfeiting than the first polymer series. While it will be some time before a comprehensive assessment can be made on the impact of the new banknotes on counterfeiting activity, at this stage counterfeiting rates have remained low, with negligible counterfeiting of the new polymer series. The upgraded banknote series also has a new feature to assist people with vision impairment, which has improved the accessibility of Australia's banknotes. Finally, and perhaps most importantly, the majority of people have now used a new banknote and the new banknote series has generally been very well received by the public. The key outcomes of the NGB program are discussed in more detail below.

Security

The use of new and upgraded security features on the second polymer banknote series ensures that the new banknotes are more secure and, as a result, more difficult to counterfeit than the first polymer series. In particular, the second polymer banknote series includes a range of new dynamic security elements that are not present on the first polymer series. For example, the second polymer series includes a holographic flying bird and reversing number in the top-to-bottom clear window. The upgraded banknotes also have a rolling colour effect; on one side of the banknote it is in a prominent patch near the top corner and on the other side it is within a bird shape.

The second polymer banknote series also includes more secure versions of features that are present on the first polymer series. For example, microtext now features not only in the background of the banknotes but also in the top-to-bottom clear window. All the windows have more intricate designs compared to the first polymer series and there are more elements that fluoresce under ultraviolet light on the second polymer series.

The second polymer banknote series also retains some of the key security features that are used in the first polymer series and are iconic to Australian banknotes. Both banknote series are printed on polymer and use intaglio ink, which has a distinct texture that can be felt by running a finger across the portraits and numerals on both banknote series.

Counterfeiting

Counterfeiting rates in Australia have fallen since 2016, after peaking in 2015. While this aligns with the introduction of the first upgraded banknote into general circulation (the $5 banknote), there is a range of other factors that also contributed to the decline in counterfeiting. (See Box A for a detailed overview of Australia's counterfeiting landscape). Nevertheless, counterfeiting rates continue to decline and remain well below their peak rates. This is expected to remain the case in the near future as the second polymer series becomes increasingly common in circulation. Overall, at this stage, it appears that the NGB program has contributed to a decrease in counterfeiting, although it will be some

time before a more comprehensive assessment can be made.

Accessibility

The introduction of a new tactile feature on the second polymer banknote series has improved the accessibility of Australia's banknotes. In particular, following extensive research by the Bank into whether an effective and durable tactile marking could be included on Australian banknotes – which included consultation with the vision-impaired community, other stakeholders and overseas central banks – a decision was made to add raised bumps on each of the long edges of the upgraded banknotes. This new feature joins existing features that help the vision impaired tell the difference between different denominations of Australian banknotes. These include: bright colours; large and bold numbers; and different sizes for each denomination of banknote.

Figure 1: Australian Polymer Banknotes

First and second polymer series

First polymer series	Second polymer series
	
	
	
	
	

Saturation

Unsurprisingly, since the issuance of the first upgraded banknotes in 2016, new banknotes have accounted for an increasing share of the total number of banknotes in circulation. In other words, the saturation rate has steadily risen.[4] The saturation rate is an important metric as it indicates how common the new banknotes are in the economy. A higher saturation rate means old banknotes series are less prevalent, which helps to prevent counterfeiting as it is more difficult to pass counterfeits of banknotes that are less common.

The new $5 and $10 banknotes are already more common than previous banknote series, as both have saturations rates above 60 per cent. This partly reflects the fact that these 2 denominations were the first to be issued into general circulation (in 2016 and 2017 respectively). However, even allowing for the differences in issuance dates, the higher denomination banknotes ($50 and $100 banknotes) have not replaced the first polymer series as quickly as the lower denominations ($5 and $10 banknotes) (Graph 1). This partly reflects the different ways that high and low denomination banknotes are used. The lower denomination banknotes are more commonly used for transactions than higher denomination notes and so tend to circulate through the economy faster. This means they also wear faster and must be replaced more often. In comparison, the higher denomination banknotes are also used as a store of wealth and so tend to circulate more slowly through the economy. In addition, the $50 banknote is the most common banknote in circulation by both volume and value, accounting for half of all banknotes in circulation. Logistically, this means it will take longer for the existing stock of $50 banknotes in the economy to be replaced compared to other banknote denominations. This slow rate of replacement of high denomination notes is one of the reasons why any decision to upgrade a banknote series should be taken in a forward-looking, pre-emptive fashion.

While the old polymer banknote series still accounts for the majority of all banknotes in circulation, most Australians have now received at least one new banknote. Indeed, a survey commissioned by the Reserve Bank in October 2020 – the RBA Online Banknotes Survey – found that 85 per cent of participants had received at least one of the new banknotes (Graph 2).[5] Interestingly, older Australians and Aboriginal and Torres Strait Islanders were less likely to have received one of the new banknotes.

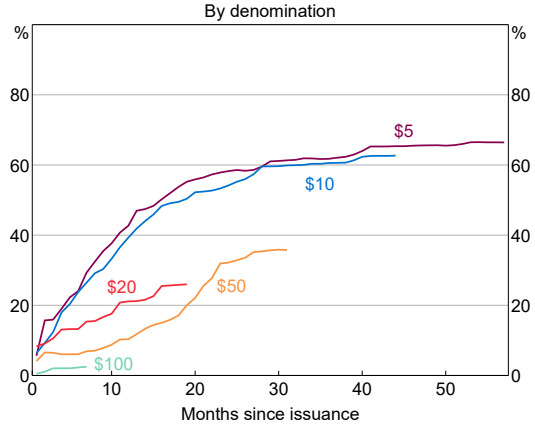
Public perception

Research conducted by the Reserve Bank indicates that the second polymer banknotes series has been well received by the Australian public. The 2020 RBA Online Banknote Survey found 77 per cent of participants viewed the new banknotes favourably (Graph 3). Notably, the new polymer banknotes have been even more positively received than the first polymer series; 43 per cent of participants

Graph 1

Saturation Rates of Second Polymer Series*

By denomination



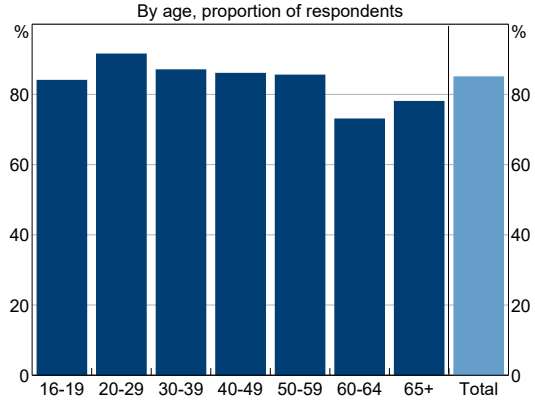
* Saturation rate - proportion of second polymer series banknotes to total banknotes in circulation

Source: RBA

Graph 2

Have You Received One of the New Banknotes?

By age, proportion of respondents



Source: RBA

responded that they liked the second polymer series a lot, while only 30 per cent of participants responded that they liked the previous series a lot. The positive reaction to the new banknote series has been a consistent feature of the past 2 surveys, with similar outcomes observed in 2017 and 2019.

When asked what aspects of the new banknotes they liked, participants identified durability, the Australian look and the fact that the banknotes are waterproof (Graph 4). Respondents also liked the inclusion of clear windows and the tactile feature on the banknotes. In fact, only 5 per cent of participants noted that there was nothing they liked about the second polymer series. There was also very little that the public disliked about the new banknotes, with almost 50 per cent of participants noting that there was nothing they disliked. That said, there were some aspects of the new series that some respondents disliked, such as the perceived slipperiness of the banknotes (16 per cent of participants) and that the notes are made of plastic (15 per cent of participants; Graph 5).

Lessons from the NGB program

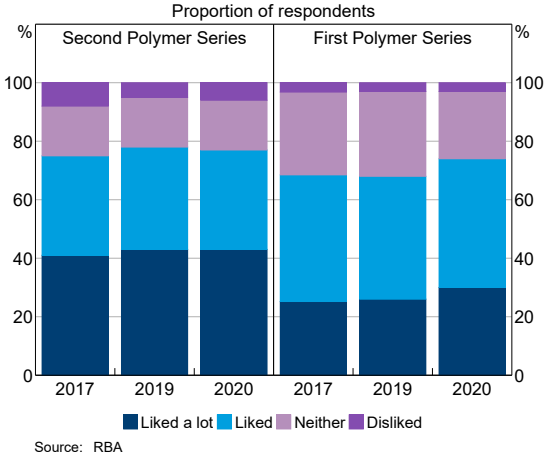
Having just completed the current upgrade, there are no plans to issue a new banknote series in the foreseeable future. Nevertheless, there are a number of aspects of the NGB program that proved to be particularly important in ensuring the overall success of the program and will be key lessons for any future such work. These include the involvement of subject matter experts as well as the nature of the engagement with community groups and industry.

- *Value of expert advice:* The Reserve Bank sought advice from a range of sources during the banknote development process, including from a Design Advisory Panel and other experts in areas such as Australian wattle and birdlife. The panel consisted of 6 experts across a range of fields, including design, Australian art and history, and banknote development and production. It was formed in 2011 and provided advice throughout the NGB program on banknote designs to ensure their historical accuracy and relevance and the appropriateness of images and themes. Advice

Graph 3

Public Perception of Banknotes

Proportion of respondents

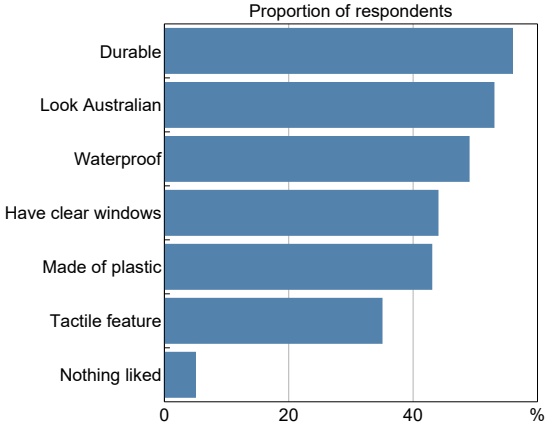


Source: RBA

Graph 4

What the Public Likes About the Second Polymer Series

Proportion of respondents

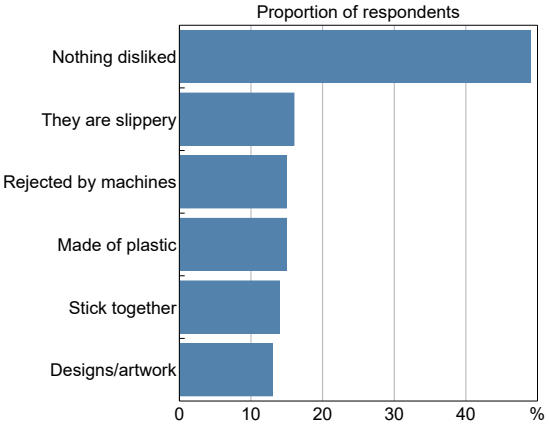


Source: RBA

Graph 5

What the Public Dislikes About the Second Polymer Series

Proportion of respondents

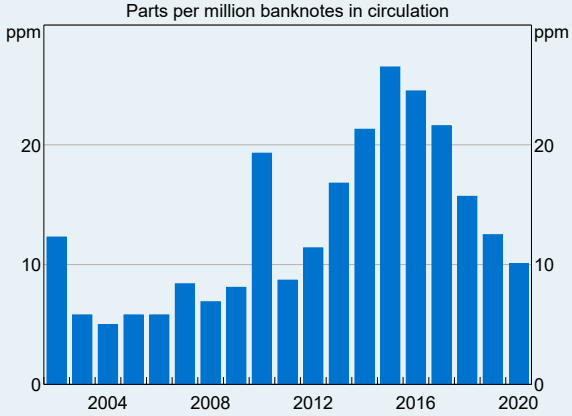


Source: RBA

Box A – Australia's Counterfeiting Landscape

In the lead-up to the release of the second polymer banknote series in 2016, Australia's counterfeiting rate had been rising steadily. From a low year-end counterfeiting rate of 5 parts per million (ppm) in 2004, the year-end counterfeiting rate reached 27ppm in 2015, which equates to one counterfeit for every 37,000 banknotes in circulation (Graph 6).

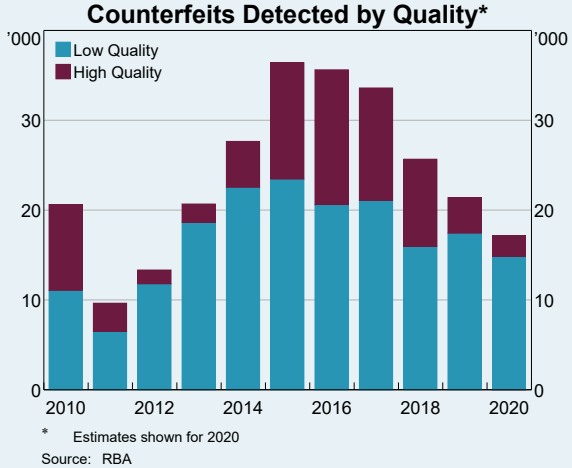
Graph 6
Counterfeits Detected*
Parts per million banknotes in circulation



* Estimate shown for 2020
Source: RBA

The increasing number of counterfeits was also accompanied by an increase in the overall sophistication of the counterfeit banknotes being detected. From 2015 until 2018, more than 35 per cent of the counterfeits detected were assessed to be of high quality (Graph 7). These high-quality counterfeits present a greater threat as it is less likely that people will identify them. As technology had progressed over the 25 years since the introduction of the first polymer series, counterfeiters could more easily access printers capable of producing high-quality counterfeit banknotes that require only moderate costs and skill. Furthermore, the printers could produce high volumes of counterfeits. These increases in the quality and quantity of counterfeit banknotes highlighted the need for improved security in the new banknote series.

Graph 7
Counterfeits Detected by Quality*



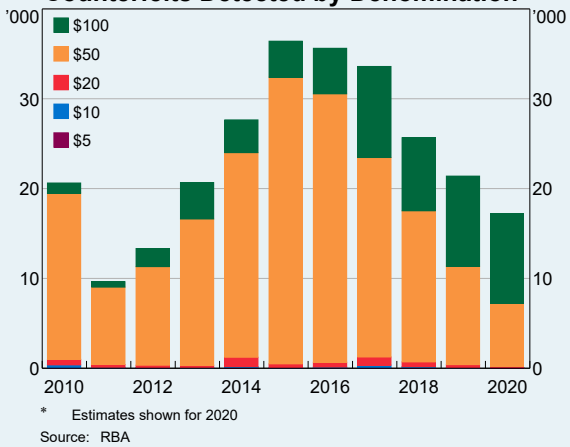
* Estimates shown for 2020
Source: RBA

Since 2015, the counterfeiting rate has been steadily declining, with the year-end counterfeiting rate for 2020 at only 10ppm. This is the first time since 2011 that the counterfeiting rate has been this low. This decline correlates closely with the staggered release of the new banknote series and certainly, as the prevalence of the new series in circulation increases, it becomes harder for counterfeiters to continue to pass counterfeits of the first polymer series. That said, the release of the new banknote series is not the primary factor that has reduced counterfeiting. During the same timeframe, a number of effective police operations have been undertaken to disrupt and shut down high-quality, high-volume counterfeiting sources. These police operations have significantly impacted the counterfeiting rate and have reduced both the number of counterfeits and also the overall quality of counterfeit banknotes detected.[6]

The steady decrease in overall counterfeiting volumes since 2015 has primarily been driven by a decrease in the number of counterfeit $50 banknotes detected. The decrease in $50 counterfeits commenced prior to the introduction of the NGB $50 banknote in 2018 and has continued to reduce year on year up to and including 2020; most likely due to law enforcement activities. At the same time, this decrease in $50 counterfeits has been somewhat offset in recent years by a significant increase in the number of counterfeit $100 banknotes detected (Graph 8). In 2020 the $100 denomination accounted for 58 per cent of all counterfeits detected and this is the first time in the last decade that the $100 has been the most counterfeited denomination over a full year. This increase has been largely driven by a few active counterfeiting production sources that are targeting the $100 denomination.

Graph 8

Counterfeits Detected by Denomination*



* Estimates shown for 2020

Source: RBA

To date less than 50 counterfeits of the new banknote series have been detected in circulation. All of these counterfeits have been low quality and in each instance at least one key overt feature has not been simulated. While the number of NGB counterfeits detected in circulation is expected to rise over the coming years, the overall counterfeiting rate is expected to remain low as fewer counterfeits of the first polymer series are used in circulation.

from the panel and other subject matter experts proved to be very important in helping to ensure the new banknotes met the needs of the community.

- *Value of public engagement:* Public engagement proved to be a valuable component of the NGB project. The clearest example was the Bank's consultation with the vision-impaired community, which led to the inclusion of the new tactile feature on the top and bottom long edge of the new banknotes. This engagement helped ensure the new banknotes were accessible to the vision-impaired community, with advice provided on the selection of the specific type of tactile element that now features on each of the 5 banknotes in the upgraded series.
- *Value of industry involvement:* Significant changes occurred in the cash handling industry in the 2 decades between the issuance of the first polymer banknote series in the mid 1990s and the issuance of the new polymer banknote series, particularly in regards to the number of banknote machines and equipment. In recognition of this, the Reserve Bank began engaging with the industry early in the

program. The Reserve Bank provided test banknotes to equipment manufacturers to allow them to update their equipment to transport, authenticate, count and process Australia's banknotes. Test material was also made available to a range of other organisations, including retailers and financial institutions. These organisations used the banknotes to confirm that their machines had been upgraded satisfactorily. This industry engagement helped ease disruption from the introduction of the new banknotes.

However, there were some aspects of the NGB program that could have been improved and that provide important lessons for future work. For instance, the significant length of time between the issuance of the first and second polymer banknote series meant that the Reserve Bank had limited recent experience in designing and issuing a new banknotes series. As a result, additional time was required to upskill staff and increase knowledge and capabilities, which contributed to the overall length of the NGB program. In addition, while engagement with the cash handling industry was a key element of the overall success of the program, there were aspects of this engagement that could have been improved. For instance, initially the Reserve Bank limited the provision of test material to banknote equipment manufacturers. While test material was offered to a greater range of organisations later in the program, it would have been beneficial to engage with the broader cash handling industry from the beginning.

Conclusion

The NGB program successfully delivered a suite of new Australian banknotes with a range of innovative new security features. The banknotes have generally been well received by the general public and counterfeiting rates remain low. While the NGB program has now concluded, the Reserve Bank intends to continue to build on the strong relationships that were developed with key stakeholders and contributed so much to the overall success of the program.

Footnotes

[*] The authors are from Note Issue Department.

[1] For detailed information on the end-to-end process of developing a new banknote series, see Fox, Liu and Martz (2016).

[2] For more information on the nature of stakeholder engagement during the NGB program, see Evans, Gallagher and Martz (2015).

[3] Further information on the range of security features on the new banknote series are available on the Bank's dedicated banknote website (<https://banknotes.rba.gov.au>).

[4] Saturation is normally calculated as a rate for each banknote denomination rather than for the entire series. For example, there are around 334 million new $50 banknotes currently in circulation and about 929 million $50 banknotes in total, so the new $50 banknote has a saturation rate of 35.9 per cent.

[5] The RBA has conducted a biennial Online Banknotes Survey since 2010. The survey aims to gauge community perceptions and understanding of Australia's banknotes, experiences with counterfeit banknotes and cash use preferences. To obtain timely insight on the impacts of the COVID-19 pandemic on cash use, the latest survey was brought forward by 6 months to October 2020. In total, 1,070 people participated in the survey, providing a representative sample of Australians. For more details on the results of 2020 survey, see Guttmann *et al* (2021).

[6] For more information on Operation Gridline, see Miegel and Symeonakis (2020).

References

Fox P, C Liu and A Martz (2016), 'New Banknotes: From Concept to Circulation', RBA *Bulletin,* September, pp 1–11.

Evans A, G Gallagher, A Martz (2015), 'Banknote Stakeholder Engagement', RBA *Bulletin*, September, pp 1–12.

Guttmann R, C Pavlik, Ung B, G Wang (2021), 'Cash Demand during COVID-19', RBA *Bulletin*, March, viewed 29 March. Available at <https://www.rba.gov.au/publications/bulletin/2021/mar/cash-demand-during-covid-19.html>

Miegel K, K Symeonakis (2020), 'A Counterfeit Story: Operation Gridline', RBA *Bulletin*, December, viewed 21 April. Available at <https://www.rba.gov.au/publications/bulletin/2020/dec/a-counterfeit-story-operation-gridline.html>

The Transition from High School to University Economics

Gian-Piero Lovicu[*]

Photo: Lawrence Sawyer – Getty Images

Abstract

To promote economic literacy and ensure the long-term health of the economics discipline, it is important to address the sharp decline in the size and diversity of the economics student population. Administrative data from the University Admissions Centre (UAC) provides information about how students transition from high school to university economics. These pathways suggest that interventions to increase the number and diversity of students studying economics in Year 12 can strengthen the pipeline of students into university economics. Interventions to improve the economic literacy of Year 12 economics students who are less socially advantaged are important to encourage more diversity in university economics; in contrast, female students appear to need less academic support and may instead benefit more from tailored interventions that pique their interest in and confidence with economics. More advocacy of economics should also increase its uptake at university, particularly among students already studying economics and/or a STEM subject in Year 12 and higher performers.

Introduction

The size and diversity of the economics student population has declined sharply in recent decades (Dwyer 2017 and Livermore and Major 2020). Addressing this decline is important for promoting economic literacy in the wider community and ensuring the long-term health of the economics discipline. And as many of those who study economics determine public policy, there are wider social benefits when these decision-makers are broadly representative of society (Brainard 2017). Consequently, in 2016, the Reserve Bank established a public education program to support economics educators and students, both at the high school and tertiary level. This article looks at how students

transition from high school to university and identifies the characteristics of those who choose to study economics at university (and those who do not). Using these data it proposes interventions to improve engagement with economics and economic literacy, particularly among groups that are important for the program's diversity objectives, to help encourage a larger and more diverse pool of students to study economics at university.

The public education program provides economics content for students and educators, professional development activities for educators and a pool of Bank speakers (Ambassadors) to deliver economic talks and events for students around Australia. The program's content and events have 2 broad aims: literacy and advocacy. The literacy aspects of the program primarily aim to improve students' and teachers' understanding of economic concepts and provide information about conditions in the Australian and global economies. The advocacy part of the program aims to influence students' decision-making about further study and/or a career in economics. It highlights the relevance of economics as an area of study that can lead to a diverse range of career paths.

To date, the research and liaison activities which inform the Bank's education program have looked at students studying economics at high school separately from those studying it at university. However, these populations are not independent because a secondary education is a prerequisite for entry into university. Students' exposure to economics is a fluid journey with multiple entry and exit points (Figure 1). Moreover, it is the transition between different parts of the journey where the Bank's education program can have the greatest impact, because it can influence a specific decision students must make on whether to enter, exit or continue in the discipline.

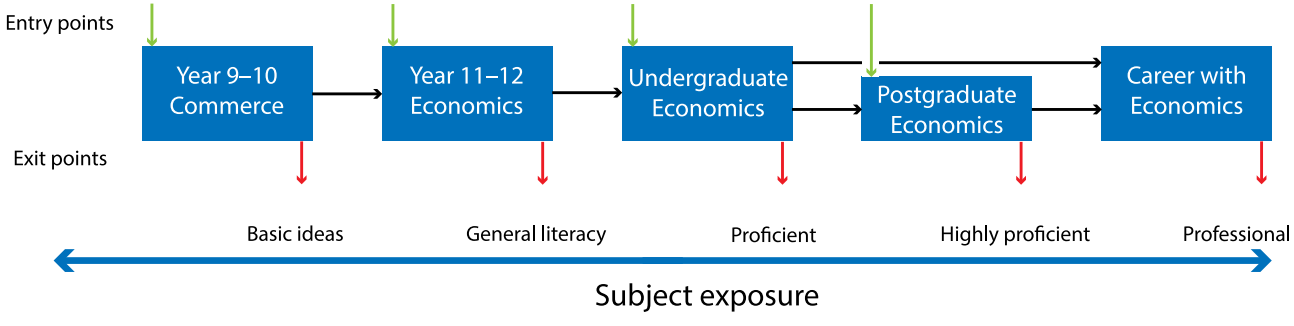
A new administrative dataset from the University Admissions Centre (UAC) sheds light on how students studying economics (or not) at high school transition to studying economics (or not) at university. It includes data on students' performance and study choices in Year 12, students' preferences for university courses and demography. These data help to build a profile of the students who populate the pipeline from high school into university economics. They also provide insights into why some students choose not to study economics at university, especially among those who express some interest in doing so.

University admissions data

Gaining admission into university

Understanding the data that describe the transition of Year 12 students from high school to university requires some background on the university admissions process. UAC is responsible for processing most admissions to undergraduate courses at participating institutions (which are mainly universities located in NSW and the ACT). For Year 12 students, admission is primarily based on a student's results in the Higher School Certificate (HSC), which are used to calculate their Australian Tertiary Admissions Rank (ATAR). The ATAR is a number between 0.00 and 99.95 that measures a student's position relative to all of the students in their age group. For example, an ATAR of

Figure 1
Stylised Representation of a Student's Journey through the Economics Discipline



80.00 means that a student is ranked 20 percentage points below the top of their age group (University Admissions Centre 2021).

Admission to most university courses is determined by a student achieving a minimum selection rank, which equals the student's ATAR plus any adjustment factors for which the student is eligible.[1] Students submit a set of ordered preferences for university courses to UAC. For a given preference, if a student's selection rank is above a threshold set by the institution and there are places available in the course, an offer is made to the student. Once an offer is made, no further preferences are considered for that student.[2] After students have accepted an offer, they can approach the university to enrol in the course. At the end of the admissions process, UAC publishes the lowest selection rank that was required for entry into each course, known as the 'cut-off'.[3]

UAC has combined the administrative data collected during the admissions process (depicted in Figure 2) with students' study patterns in Year 12, performance in the HSC and demography to form a rich dataset tracking how students transition from high school to university.[4]

Which university courses are economics courses?

Unlike high school where students study discrete well-defined subjects, university students undertake courses which often cover a diverse range of individual subjects or subject matter. So how does the UAC dataset capture whether a student is studying economics at university? Ideally, it would capture any student who completes a threshold level of economics, such as a major. A major in economics can be undertaken in a number of courses. However, measuring the students taking an economics major is not possible in these data because universities only provide UAC with the course in which applicants enrol. Instead, the proxy for an economics major in this dataset is the dedicated economics courses offered by universities. Furthermore, our dataset also includes information on enrolments in the related courses of commerce, finance and business (hereafter referred to as commerce) in which students can take an economics major.

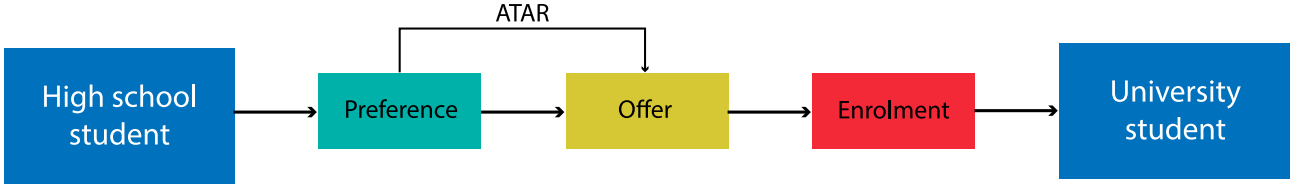
Breaking down the transition from high school economics to university economics

University preferences, offers and enrolments

Based on the admissions process, students can have 4 types of interactions with a particular university course. Their interaction reflects the furthest stage of the enrolment process that they reached: did not preference a course; did preference a course; offered a place in a course (but did not enrol); and enrolled in a course.[5] These categories form a hierarchy that can proxy for a student's interest in a university course.

We find that interest in economics at university is low, even for those who studied it in Year 12. Almost two-thirds of Year 12 economics students, and around 95 per cent of other Year 12 students, applying to UAC *did not* preference an economics course for university (Graph 1). Low interest in economics courses could be because universities offer relatively few dedicated economics courses, economics courses are seen as more specialised than other courses, or because there is low engagement with economics. Interest in university commerce courses is much higher than for economics, especially among Year 12 economics students (Graph 2). This could be because commerce courses have broad scope, are offered at

Figure 2
Transitioning from High School into a University Course



a wider range of universities than economics courses and are perceived to make graduates highly employable.

Nevertheless, studying economics at school is still an important pathway for doing so at university. On average, around 10 per cent of Year 12 economics students enrolled in a dedicated economics course at university while 30 per cent enrolled in a commerce course. For both course types these rates of enrolment are much higher than for students who did not study Year 12 economics. Students who study economics in Year 12 also demonstrate more of an interest in studying economics or commerce at university than other Year 12 students by receiving an offer to enrol in it or including it as a preference.

Importance of Year 12 economics students for the university pipeline

Although students who studied economics in Year 12 have a much higher rate of enrolment in university economics than other Year 12 students, it is important to consider the pathway of *all* Year 12s who go on to enrol in university economics. This is because Year 12 economics students make up only a very small (and declining) share of the students who apply to university through UAC each year, and because studying economics at high school is not a prerequisite for doing so at university.

Despite being a small group, Year 12 economics students make an important contribution to the pipeline of students enrolling in economics and commerce courses. Around 60 per cent of high school students who enrol in university economics studied economics in Year 12 (Graph 3). Of the high school students who enrol in commerce courses, around 35 per cent studied economics in Year 12.

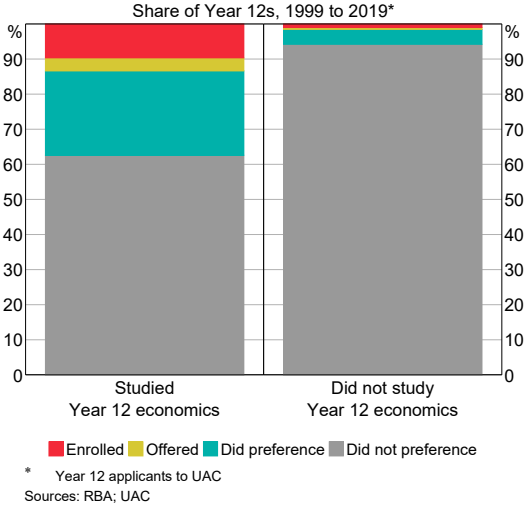
Outside of economics, STEM (Science Technology Engineering Mathematics) students made up most of the remaining pool of students who enrol in economics at university (Graph 3).[6] In total, around 90 per cent of high school students who enrol in university economics studied a STEM subject in Year 12 and/or economics. (A similarly high share is found for those who enrolled in commerce courses.)

Graph 4 shows enrolments in university courses over time. Studying economics in Year 12 has become more common among university economics students over the past 20 years or so and has been matched by a corresponding decline in the share of students who studied a STEM subject, but not economics, in Year 12. In contrast, the share of students who did not study either a STEM subject or economics in Year 12 is little changed in economics courses, but has increased significantly in commerce and other university courses (Graph 4). Together these data highlight that Year 12 economics students are increasingly important for the pipeline into university economics and also the particular challenge that

Graph 1

Preferences for University Economics

Share of Year 12s, 1999 to 2019*



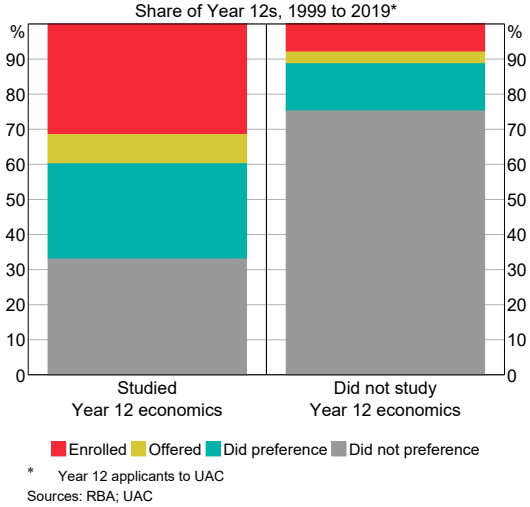
* Year 12 applicants to UAC

Sources: RBA; UAC

Graph 2

Preferences for University Commerce

Share of Year 12s, 1999 to 2019*



* Year 12 applicants to UAC

Sources: RBA; UAC

the economics discipline faces in attracting students from the broader student population.

Enrolment gaps

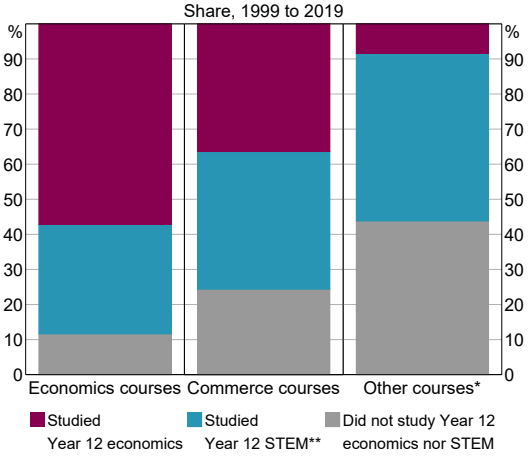
A student who did not enrol in an economics course at university may have not done so because they did not obtain the necessary selection rank (a 'performance gap'), or because they were not interested enough in the subject (an 'interest gap'), or both. Taken together, these two drivers make up an (unobservable) 'enrolment gap'. The two drivers are likely to be correlated: a student who is interested in a subject is more likely to work harder and so perform better; conversely, a student who performs (or expects to perform) well in a subject is more likely to feel successful enough to pursue further study in it.

Performance gaps and interest gaps could both be reduced by a suitable education intervention, such as the literacy and advocacy aspects of the RBA's education program. Interventions targeting literacy are more likely to narrow performance gaps, while advocacy could boost interest, and therefore performance indirectly. Both forms of intervention could spur a student who would not otherwise have done so to enrol in a university economics course.

Graph 3

Enrolments in University Courses

Share, 1999 to 2019



* Applicants to all other courses. Some applicants did not enrol in any course

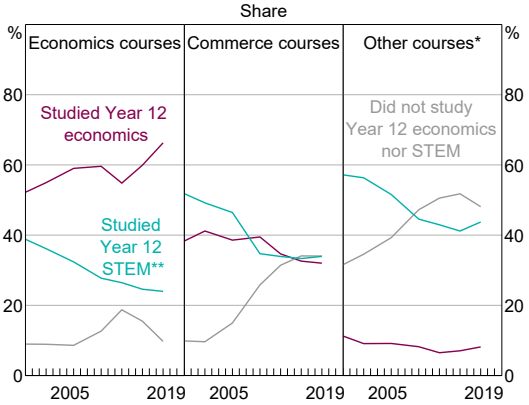
** At least one STEM subject, but no economics

Sources: RBA; UAC

Graph 4

Enrolments in University Courses

Share



* Applicants to all other courses. Some applicants will not have enrolled in any course

** At least one STEM, but no economics

Sources: RBA; UAC

Year 12 economics students

Year 12 economics students who scored highly enough to receive a place in a university economics course, but did not enrol, only had an interest gap to close. This includes all of the students who were offered a place in an economics course, but chose not to enrol, as well as any others who scored highly enough to receive an offer (and may or may not have included an economics course among their preferences). Interventions targeting economics advocacy and careers, as opposed to those that target economic literacy, are likely to be most helpful for this group. For students who did not score highly enough to receive a place in an economics course, the enrolment gap contains a performance and possibly an interest component. All interventions are helpful for this group, though the enrolment gap is likely to be larger in absolute terms and progress may be required on both fronts. Closing the performance gap is more challenging than closing the interest gap, since economics is only one of the high school subjects that contributes to a student's ATAR.

Graph 5 shows performance outcomes for Year 12 economics students, based on their preference for an economics course. The dashed line represents the cut-off for enrolment into economics courses, weighted by enrolments in each course. Students who showed an interest in university economics (did preference, offered or enrolled) performed better than their peers (did not preference), in both Year 12 economics and the ATAR.

Both the performance gap (Graph 6) and interest gap (Graph 7) varied by demography and in many cases were smaller for more socially advantaged groups. 'Socially advantaged' encompasses students from non-government (Independent and Catholic) schools, central Sydney schools and families whose parents had a university education.[7] Economics students from government schools, males, and students from outside of central Sydney performed less well than other students and were also more likely to have a performance gap (Graph 6). The performance gap was largest among students from (non-selective) government schools. At the same time, Graph 7 shows that Year 12 economics students who showed an interest in university economics (and so had a smaller interest gap) were more likely to come from a socially advantaged background or be male.

Despite showing less interest and a lower rate of enrolment into university economics, females consistently outperformed males (in Year 12 economics and overall) and as a result were much less likely to have a performance gap (Graph 6). Though this accords with the general performance of female students in the HSC, outperformance is larger for female economics students. This finding is perhaps surprising given the large decline in female students studying economics and a lack of confidence with economics observed among females in the RBA student survey (Livermore and Major 2020). A larger interest gap among females than males (Graph 7) might have arisen because of factors such as females' (subjective) lack of confidence in their ability to do well in economics, higher perceived risks because of a lack information about economics and fewer clear perceptions of career opportunities from studying economics (Livermore and Major 2020).

Other Year 12 students

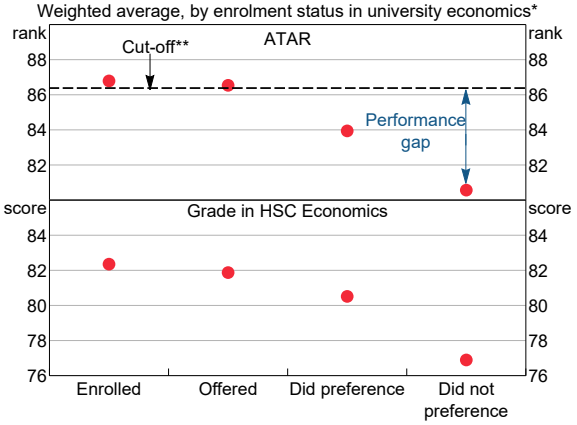
Similar to Year 12 economics students, other students in Year 12 who did not have a performance gap tended to come from a socially advantaged background and/or be female (Graph 8). Students who studied a STEM subject in Year 12 were also less likely to have a performance gap than Year 12s who did not study STEM or economics (Graph 8).

Students who took a STEM subject in Year 12 (but not economics) make a non-trivial contribution to the pipeline of students studying economics at university, though their decline in importance implies that an interest gap may have emerged among some types of STEM students where it did not exist before (Graph 4). Only a small share of STEM students ever show an interest in studying economics at university, comparable to the share of

Graph 5

Performance of Year 12 Economics Students

Weighted average, by enrolment status in university economics*

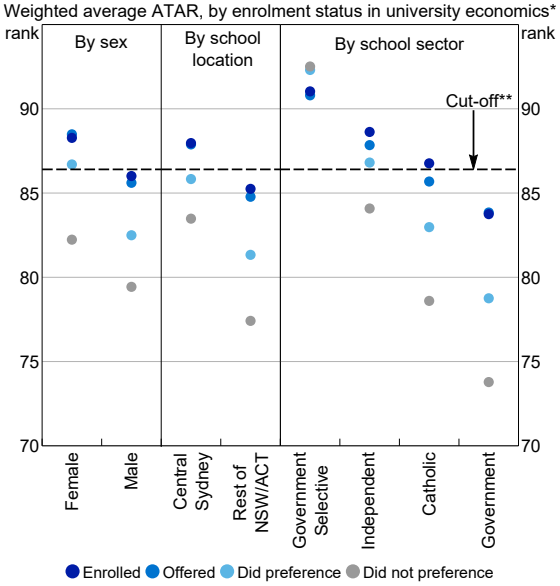


* From 2002 to 2019. Weighted by count of students in each group
** Weighted by count of enrolments in university economics courses
Sources: RBA; UAC

Graph 6

Performance of Year 12 Economics Students

Weighted average ATAR, by enrolment status in university economics*



* From 2002 to 2019. Weighted by count of students in each group
** Weighted by count of enrolments in university economics courses
Sources: RBA; UAC

interested students who do not study economics or STEM subjects (Graph 9). This does not necessarily mean that STEM students do not have the potential to show interest in economics. Rather, it probably just means that students taking STEM subjects are a large, multi-disciplined group who consider a wide range of options for university study.

Implications for the Bank's public education interventions

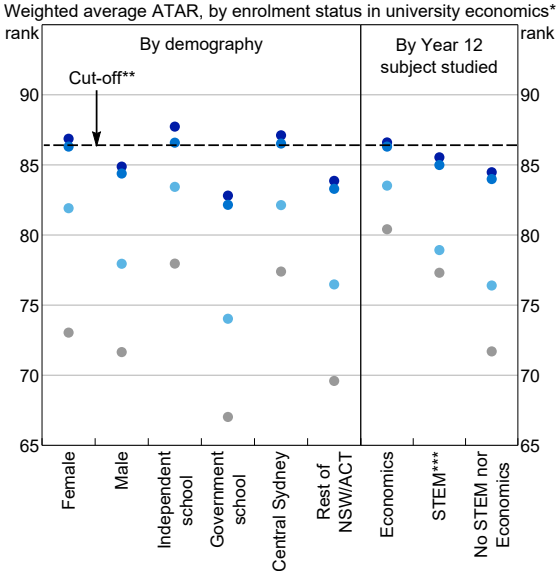
Advocacy and literacy interventions each have a role to play in encouraging Year 12 students to consider economics at university. Aiming for a larger and more diverse cohort of Year 12 economics students is a key priority of the Bank's public education program. Even though this pool of students has been diminishing, they have a higher rate of enrolment in university economics than do other students and make up a large and growing part of the pipeline from high school to university. Therefore, interventions that advocate Year 12 economics to younger students are valuable, especially as they may also lead to a narrowing in a student's enrolment gap for university economics.

Literacy interventions are helpful for all Year 12 economics students, but are most relevant for students with a performance gap. As a result, they are likely to be most effective when delivered to students who are important for increasing the diversity of the economics student population (aside from females), because these students are more likely to have a performance gap to overcome. Particular effort is required in this group

Graph 8

Performance of Year 12 Students

Weighted average ATAR, by enrolment status in university economics*



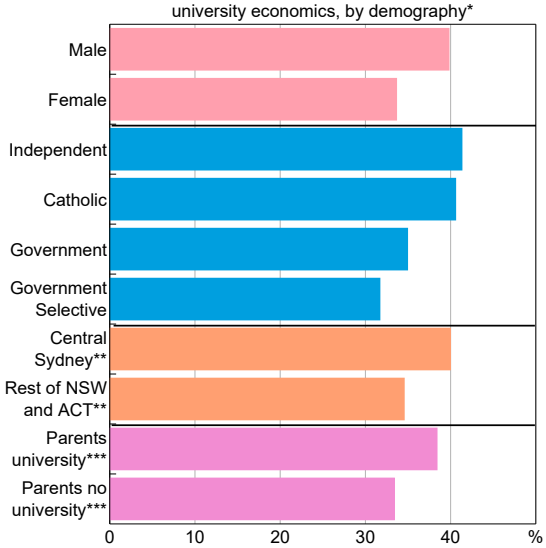
* From 2002 to 2019. Weighted by count of students in each group
** Weighted by count of enrolments in each university economics course
*** At least one STEM, but no economics

Sources: RBA; UAC

Graph 7

Preferences for University Economics

Share of Year 12 economics students interested in university economics, by demography*



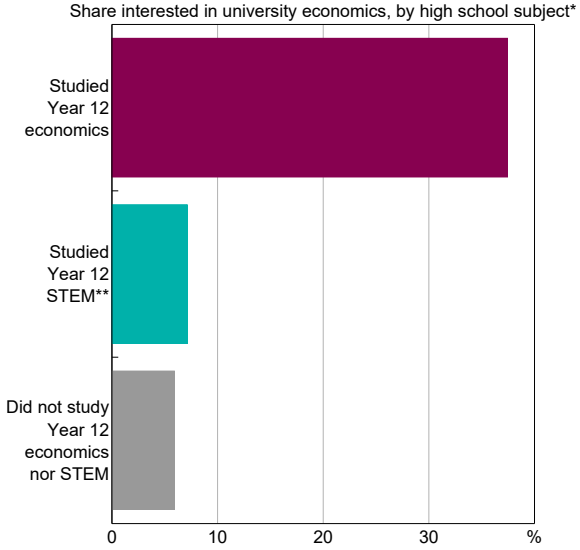
* Interest is defined as students who enrolled, were offered or did preference a university economics course. Between 1999-2019
** Location of high school
*** At least one parent with a Bachelor's degree or higher

Sources: RBA; UAC

Graph 9

Preferences for University Economics

Share interested in university economics, by high school subject*



* Interest is defined as students who enrolled, were offered or did preference a university economics course. From 1999 to 2019
** At least one STEM subject, but no economics

Sources: RBA; UAC

to both close the performance gap and encourage engagement with economics, and is central to increasing economic literacy in the wider community.

All Year 12 students may respond to advocacy interventions that encourage engagement with economics, especially those with a smaller overall gap to enrolment. A key area where the education program could address its diversity goal is by conducting more advocacy tailored specifically to females, as female students appear to need less academic support than males. For instance, this could involve leveraging our female Ambassadors as role models (Porter and Serra 2020, Li 2018). Those who take economics in Year 12 and those who come from socially advantaged backgrounds appear to have the smallest enrolment gap to overcome (in both performance and interest terms) and may be more responsive than others to advocacy interventions. As a result, advocacy to this group is likely the easiest path to increasing total enrolment numbers – but not diversity.

Students who study STEM subjects (but not economics) may also be influenced by advocacy interventions. These could focus on raising awareness about economics, particularly among those who are currently not receiving information about it (Bayer, Bhanot and Lozano 2019, Chambers *et al* 2021). For instance, advocacy interventions could highlight economics as a career that pays well (Guttmann and Bishop 2018), offers opportunities to solve complex problems in a similar fashion to engineering and maths, and shapes policy that meaningfully affects society.

An awareness of the size and composition of enrolment gaps among students can help the Bank further develop its public education program to best serve specific groups of students, based both on their needs and on the strategic objectives of the program.

Footnotes

[*] The author is from the Information Department and would like to thank Helen Tam from the University Admissions Centre for her assistance in putting together the data used in this article.

[1] For example, students may qualify for an adjustment to their ATAR if they have a disadvantage or perform well in a particular subject. While the selection rank determines admission to most university courses, there are some exceptions (such as university courses where an interview is also required). Some students may also apply for admission directly to universities, which is outside the UAC system.

[2] Within an offer round. There are multiple rounds of offers and students are free to adjust their preferences throughout the admissions process. If a student adjusts their preferences between offer rounds, they may then receive multiple offers.

[3] Institutions can choose which adjustment factors they allow for a particular course, so a student's selection rank will differ across courses and/or institutions. As a result, our dataset includes data on ATARs, rather than selection ranks, to allow for like-for-like comparison across courses and institutions.

[4] These data are limited to high school students who finish Year 12 and apply to university through UAC. We cannot assess the profile of other students enrolling in university economics (including those who enrol outside of the UAC system). Partial data on UAC applicants that do not transition from high school straight into university suggests that the pipeline from high school is the most important group for university economics courses.

[5] Students are considered to have included a university course as a preference if it was in their top 5 choices at some point during the admissions cycle.

[6] STEM subjects include advanced mathematics (plus extensions 1 and 2), chemistry, physics, engineering studies, information processes and technology and software design and development.

[7] The definition of central Sydney in the dataset encompasses all of the inner ring of Sydney and parts of the middle ring with a number of suburbs with high socio-economic status. Areas included are *City and Inner South, Eastern Suburbs, Inner South West, Inner West, North Sydney and Hornsby, Northern Beaches, Ryde* (at the Statistical Area 4 level).

References

Bayer A, S Bhanot and F Lozano (2019), 'Does Simple Information Provision Lead to More Diverse Classrooms? Evidence From a Field Experiment on Undergraduate Economics', *AEA Papers and Proceedings*, 109, pp 110–114.

Brainard L (2017), 'Strengthening Diversity in Economics', Conference for the 2017 Summer Training and Scholarship Program sponsored by the American Economic Association and the National Science Foundation and hosted by the Department of Economics, Michigan State University, East Lansing, Michigan, 28 July. Available at <https://www.federalreserve.gov/newsevents/speech/brainard20170728a.htm>.

Chambers A, S Dickert-Conlin, C Elder, S Haider and S Imberman (2021), 'Info.Econ: Increasing Diversity among Economics Majors', *AEA Papers and Proceedings*, 111, pp 133–137.

Dwyer J (2017), 'Studying Economics: The Decline in Enrolments and Why it Matters', Address to the Business Educators Australasia Annual Council Meeting, Sydney, 29 July.

Guttmann R and J Bishop (2018), 'Does It Pay to Study Economics?', RBA *Bulletin*, June, viewed 2 June 2021. Available at <https://www.rba.gov.au/publications/bulletin/2018/sep/does-it-pay-to-study-economics.html>.

Li H-H (2018), 'Do mentoring, information, and nudge reduce the gender gap in economics majors?', *Economics of Education Review*, 64, pp 165–183.

Livermore T and M Major (2020), 'Why Study (or Not Study) Economics? A Survey of High School Students', RBA *Bulletin*, June, viewed 2 June 2021. Available at < https://www.rba.gov.au/publications/bulletin/2020/jun/why-study-or-not-study-economics-a-survey-of-high-school-students.html>

May AM, M McGarvey and R Whaples (2014), 'Are Diagreements Among Male and Female Economists Marginal at Best? A Survey of AEA Members and Their Views on Economics and Economic Policy', *Contemporary Economic Policy*, 32(1), pp 111–132.

Porter C and D Serra (2020), 'Gender Differences in the Choice of Major: The importance of female role models', *American Economic Journal: Applied Economics*, 12(3), pp 226–254.

Pugatch T and E Schroeder (2021), 'Promoting Female Interest in Economics: Limits to Nudges', *AEA Papers and Proceedings*, 111, pp 123–127.

University Admissions Centre (2021), Australian Tertiary Admission Rank site. Available at <https://www.uac.edu.au/future-applicants/atar>.

Bank Fees in Australia During the COVID-19 Pandemic

Karl Sparks and Megan Garner[*]

Photo: Luka TDB – Getty Images

Abstract

The Reserve Bank's annual survey of bank fees shows that their fee income from both households and businesses in Australia declined notably over 2020 due to the disruption to economic activity caused by the COVID-19 pandemic.

Banks' overall income from fees declined in 2020

Since 1997, the Reserve Bank has undertaken an annual survey of the fees that banks earn through their Australian operations.[1] The survey focuses on fee income from the provision of loans, deposit services and payment services. The survey excludes fees from banks' funds management and insurance operations, and fee income from operations outside of Australia. The 24th annual bank fee survey included 15 institutions that represent around 90 per cent of the Australian banking sector by balance sheet size.[2] This article summarises the results from this latest survey, covering banks' financial years ending between March and December 2020. Accordingly, it primarily covers the period of the initial economic impact of the COVID-19 pandemic.[3]

Domestic banking fee income declined sharply in 2020, as the effects of the COVID-19 pandemic reduced spending and financial activity in the Australian economy (Graph 1; Table 1). This reflected reduced fee income from both businesses and households. Business fee income accounts for around two-thirds of banks' overall fee income, while households account for the remaining one-third of banks' fee income. The ratio of lending fee income to assets (loans) declined a little, continuing the trend of recent years. Deposit fee income decreased slightly relative to the value of deposits.

Fee income from households declined

Banks' fee income from households fell by 10 per cent in 2020. This is the largest decline in banks' fee income from households since the 2010 survey, when banks significantly reduced

Table 1: Banks' Fee Income[(a)]

	Households		Businesses		Total	
	Level	Growth	Level	Growth	Level	Growth
	$ million	Per cent	$ million	Per cent	$ million	Per cent
2017	4,490	3.3	7,922	3.4	12,412	3.4
2018	4,200	−6.5	8,134	2.7	12,334	−0.6
2019	3,963	−5.6	8,305	2.1	12,269	−0.5
2020	3,559	−10.2	7,888	−5.0	11,446	−6.7

(a) Growth rates and totals may differ from sub-totals due to rounding

Source: RBA

Table 2: Banks' Fee Income from Households[(a)]

	2018	2019	2020	Annual growth 2020	Average annual growth 2014–19
	$ million	$ million	$ million	Per cent	Per cent
Loans	3,230	3,149	2,898	−8.0	1.2
– Housing	1,170	1,160	1,188	2.4	−0.4
– Personal	354	348	313	−9.9	−1.0
– Credit Cards	1,706	1,641	1,397	−14.9	2.9
Deposits	914	755	617	−18.4	1.2
Other Fees[(b)]	56	59	44	−26.2	0.1
Total	4,200	3,963	3,559	−10.2	−1.0

(a) Growth rates and totals may differ from sub-totals due to rounding

(b) Includes banking-related fee income from households that cannot be directly related to an individual deposit or loan account (for example, travellers' cheque or foreign exchange fees)

Source: RBA

exception fees (which include dishonour, late payment and break fees) on deposit and credit card products. The decline in fee income in 2020 reflected a reduction in fee income from credit cards, household deposit accounts and personal loans as the economic effects of the COVID-19 pandemic led to reductions in household spending and associated transactions. On the other hand, fee income from housing loans increased alongside higher mortgage refinancing activity (Graph 2; Table 2). Fee income from households continued to consist largely of fees on credit cards (39 per cent), housing loans (33 per cent) and deposit accounts (17 per cent).

Fee income from deposit accounts declined by 18 per cent in 2020, reflecting broad-based declines in income from account-servicing fees, transaction fees and fees from other sources (for example, currency conversion, international cheque and money transfer fees). Banks noted that this reflected the impact of the COVID-19 pandemic, which reduced the number of transactions that consumers made using their deposit accounts, both domestically and abroad (for example, fewer international ATM withdrawals). The increased prevalence of fee waivers – either for certain customers or under certain conditions (such as when a minimum amount is deposited each month) – also contributed to the decline, continuing the trend seen in recent years (Crews and Lewis 2020).

Fee income from housing loans rose in 2020. This reflected an increase in account-servicing fees and other housing loan fee income, which was partly

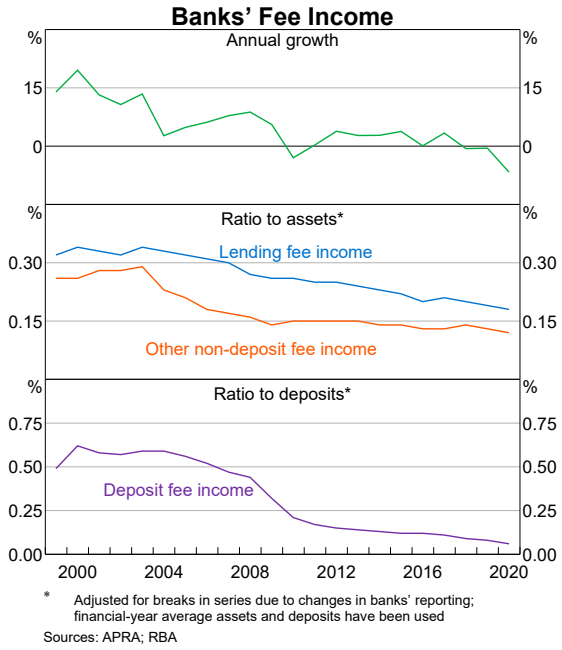
offset by lower income from transaction fees. The increase in fee income from housing loans is consistent with the high level of mortgage refinancing throughout 2020, as borrowers took advantage of the very low level of housing interest rates. When a borrower refinances their mortgage with another lender, they generally pay fees to both their new and previous lenders. These switching costs typically include an application or establishment fee for the new loan and a fee to discharge the old loan.

Income from fees on personal loans declined by 10 per cent in 2020; this includes fees associated with term loans, margin loans to households and home-equity loans where the predominant purpose is not known. A reduction in account-servicing fees was partly offset by an increase in transaction and other fees. The reduction in income from fees on personal loans is consistent with the sharp contraction in personal credit over 2020, as spending opportunities declined following the introduction of the COVID-19 containment measures in March last year.

Similarly, households' use of credit cards and credit card debt outstanding declined at the onset of the COVID-19 pandemic, leading to a 15 per cent decline in banks' fee income from credit cards over 2020. As discussed above, this was the largest decline in fee income from credit cards since banks substantially lowered exception fees in late 2009. The decline in banks' fee income from credit cards was broadly based, reflecting declines in income from account-servicing fees, transaction fees (for example, foreign exchange and cash advance fees), and exception fees. A reduction in the number of credit card accounts also contributed to the decline in fee income. In contrast, changes in unit fees were mixed in 2020 – annual fees on rewards cards increased, while annual fees on non-rewards cards, foreign currency conversion fees and late payment fees all declined (Table 3).

Income from exception fees charged to households, which form part of fee income from deposit accounts, housing loans, personal loans and credit cards, declined again in 2020 (Graph 3). This largely reflected lower exception fees on credit card and deposit accounts, with banks noting COVID-19 relief packages as a contributing factor. The decline in exception fees is a continuation of the trend seen in recent years, as banks have removed or reduced informal overdraft fees following the Royal Commission into Misconduct in the Banking and Superannuation and Financial Services Industry in 2018. In contrast, exception fee income from housing loans rose, in part owing to increased early repayment and break fees because of mortgage refinancing activity.

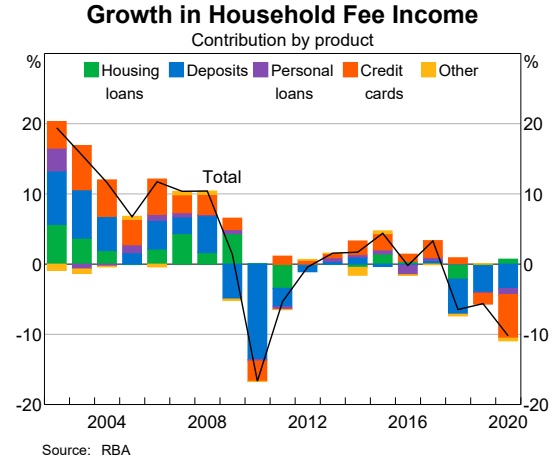
Graph 1



* Adjusted for breaks in series due to changes in banks' reporting; financial-year average assets and deposits have been used

Sources: APRA; RBA

Graph 2



Source: RBA

Business fee income also declined

Total fee income from businesses decreased by 5 per cent over 2020, owing to lower fee income

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

	2018	2019	2020	Annual growth 2020
				Per cent
Annual fees ($)				
– Non-rewards cards	54	54	53	–1.5
– Rewards cards	203	211	216	2.3
– All cards	138	140	138	–1.7
Other fees				
– Foreign currency conversion fees (per cent of value)	2.5	2.6	2.5	–5.0
– Late payment fee ($)	19	19	18	–0.7

(a) Simple average of advertised fees for cards issued by the major banks; only cards that are available to new cardholders are included in the sample; note that changes in the sample affect the average fee; includes fee-free cards; does not include any fee waivers or reductions; as at the end December of each year. Growth calculations are based on unrounded numbers.

Sources: Major banks' websites; RBA

Table 4: Bank's Fee Income from Businesses[(a)]

	2018	2019	2020	Annual growth 2020	Average annual growth 2014–19
	$ million	$ million	$ million	Per cent	Per cent
Deposit accounts	571	572	533	–6.8	–0.8
– of which: exception fees	68	69	53	–22.3	10.8
Loans	3,240	3,317	3,328	0.3	1.8
– of which: exception fees	41	48	51	7.0	1.2
Merchant service fees	3,127	3,190	2,909	–8.8	5.6
Bank Bills	15	8.9	5.4	–39.1	–27.7
Other	1,182	1,218	1,112	–8.7	–1.1
Total	8,134	8,305	7,888	–5.0	2.4
– of which: exception fees	109	116	104	–10.3	6.2

(a) Growth rates and totals may differ from sub-totals due to rounding

Source: RBA

from both small and large businesses (Graph 4; Table 4). The decrease in fee income from businesses mainly reflected a fall in 'merchant service fee' income from processing card transactions (Graph 5; discussed below). Fee income from business deposit services and other sources also declined. Fee income from businesses continued to consist largely of fee income from loans (42 per cent) and merchant service fees (37 per cent).

Fee income from business loans was little changed in 2020, as higher fee income from loans to large businesses was offset by lower fee income from loans to small businesses. The increase in fee income from large business loans primarily reflected an increase in fee income from account-servicing fees, though other fee income also increased. This is consistent with precautionary drawdowns of credit by large businesses at the beginning of the pandemic in 2020, while lending to small and medium-sized businesses was little changed over 2020 (Bank and Lewis 2021).

Merchant service fee income declined notably over 2020 (Graph 6; left hand side). These fees typically include a mix of fixed fees, such as for card payment terminals, and transaction fees for each card payment. COVID-19-related economic lockdowns reduced consumer spending for a time, which in turn led to fewer transactions being processed and fewer merchant service fees paid to banks overall.

In addition to fewer transactions, merchant service fee income declined in 2020 because banks offered fee waivers to support businesses during the COVID-19-related lockdowns. These fee waivers also contributed to a decline in banks' merchant service fee income as a share of the value of credit and debit card transactions over 2020, or, in other words, a decline in the fee income per dollar transacted with credit and debit cards (Graph 6; right hand side). This decline in the share was also supported by an acceleration in the ongoing shift from credit to debit cards, as people reduced their use of credit cards during the pandemic (Reserve Bank of Australia 2020). Because debit cards typically attract a lower fee per transaction than credit cards, a shift from credit cards to debit cards leads to lower fees paid by merchants for the same number of transactions.

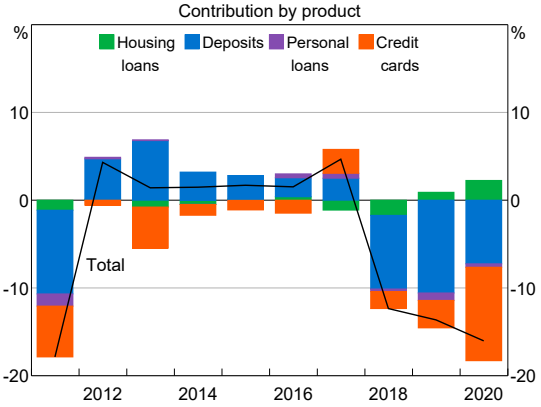
The decline in merchant service fee income in 2020 was the largest decline since 2004, when interchange fees – the fees paid by a merchant's bank to a cardholder's bank whenever a card purchase is made – declined significantly following the Reserve Bank's reforms to credit card interchange fees in 2003 (Reserve Bank of Australia 2005).

Fee income from business deposit accounts decreased by 7 per cent in 2020, largely reflecting reduced transaction fees and other fee income. The

Graph 3

Growth in Household Exception Fee Income

Contribution by product

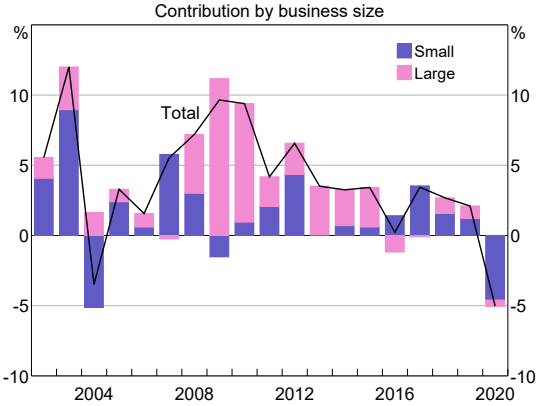


Source: RBA

Graph 4

Growth in Business Fee Income

Contribution by business size

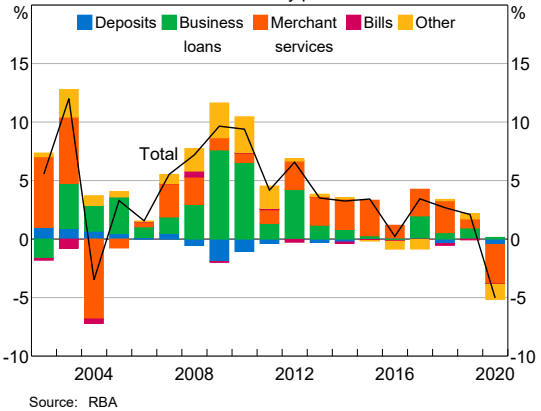


Source: RBA

Graph 5

Growth in Business Fee Income

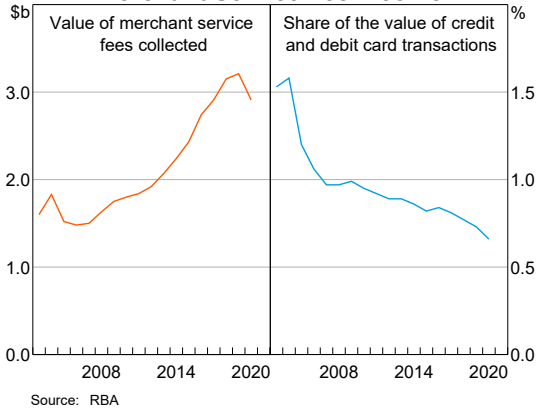
Contribution by product



Source: RBA

Graph 6

Merchant Service Fee Income



Source: RBA

reduction in transaction fees is consistent with the slowdown in economic activity during 2020 because of the COVID-19 pandemic and the fee waivers that banks provided to businesses to support customers during this time. Around two-thirds of fee income from business deposits was for deposit services provided to small businesses.

Bank bill fee income also declined over 2020, which continues the trend seen in the past few years. This reflected businesses continuing to shift from bank bills to other, more flexible lending products, with some banks ceasing to offer bank bills in response.

Footnotes

[*] The authors are from the Domestic Markets Department.

[1] The data from the survey are published in the Reserve Bank's Statistical Table C9.

[2] Survey results have been affected by mergers and acquisitions among participating institutions, and by some changes in participants' reporting methodology. Where possible, data have been revised to reflect this.

[3] Improved data on bank fees are scheduled to be reported from November 2021 as part of the new Economic and Financial Statistics (EFS) collection – these data are designed to be more consistent across institutions, including because they will be based on a consistent reporting period. For more information on the EFS collection, see (Garner 2020).

References

Bank J and M Lewis (2021), 'Australia's Economic Recovery and Access to Small Business Finance', RBA *Bulletin*, March, viewed 24 May 2021. Available at <https://www.rba.gov.au/publications/bulletin/2021/mar/australias-economic-recovery-and-access-to-small-business-finance.html>.

Commonwealth of Australia (2019), 'Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry', Final Report, February. Available at <https://www.royalcommission.gov.au/royal-commission-misconduct-banking-superannuation-and-financial-services-industry>.

Crews S and M Lewis (2020), 'Bank Fees in Australia', RBA *Bulletin*, June, viewed 24 May 2021. Available at <https://www.rba.gov.au/publications/bulletin/2020/jun/bank-fees-in-australia.html>

Garner M (2020), 'Insights from the New Economic and Financial Statistics Collection', RBA *Bulletin*, September, viewed 24 May 2021. Available at <https://www.rba.gov.au/publications/bulletin/2020/sep/insights-from-the-new-economic-and-financial-statistics-collection.html>.

Reserve Bank of Australia (2005), 'Banking Fees in Australia', *Bulletin*, May, pp 65–69.

Reserve Bank of Australia (2020), 'Domestic Finanical Conditions', *Statement on Monetary Policy*, August, p 72.

Low Interest Rates and Bank Profitability – The International Experience So Far

Mark Hack and Sam Nicholls[*]

Photo: PM Images

Abstract

This article discusses the effect that low interest rates may have on bank profits, and reviews the experience of banks in economies that have had very low interest rates for an extended period. In the short to medium run, low or negative interest rates appear to reduce bank profits only a little, after accounting for the positive effects of lower interest rates on loan losses and demand for credit. However, the negative effects on bank profits increase when interest rates remain very low for a prolonged period. The profits of smaller banks – which have more household deposits, limited pricing power or less capacity to adjust their activities – are more sensitive to a prolonged period of low interest rates.

Short- and long-term interest rates have fallen to very low levels in many advanced economies, following decades of decline (Graph 1). Market pricing indicates that interest rates are expected to remain at low levels for at least several years. While low rates are appropriate to support economic activity during times of weak growth, they can also facilitate a build-up of risk in the financial system. One way low interest rates might increase risk is by weighing on bank profits, thereby lowering their resilience.

Why does bank profitability matter?

Profitable banks are an important part of a stable financial system. Profits are a buffer against which banks can write off loan losses and a source of funds for rebuilding capital should a bank incur large losses. They also allow banks to attract outside capital. However, it is important to consider bank profits on a risk-adjusted basis. Very high bank profitability can reflect very high risk-taking, which can threaten financial stability. High profits could also reflect a lack of competition.

Bank profitability can also influence the transmission of monetary policy by affecting banks' willingness or ability to extend credit. In principle, if very low interest rates reduce bank profits substantially, then the net benefits from easing monetary policy further could decrease. In the extreme, easing policy could be self-defeating if lower profitability reduced banks' willingness to supply new credit (Brunnermeier and Koby 2019; Eggertsson *et al* 2019). Similarly, a given reduction in policy interest rates may provide less stimulus when interest rates are already low if banks widen their lending spreads to protect their profitability (Brassil, Cheshire and Muscatello 2018).

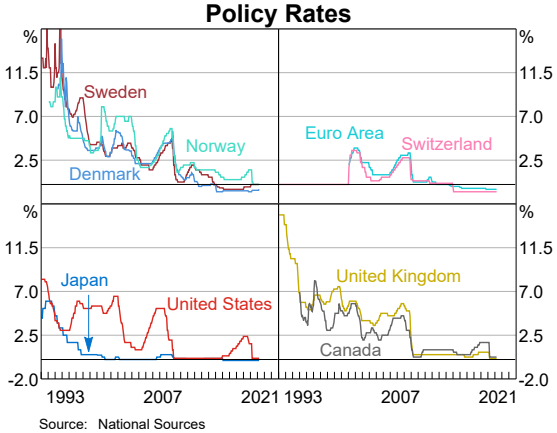
How can low interest rates affect bank profitability?

As banks adjust to a low interest rate environment, there will be various effects on their profits. Some effects are positive, others negative and some are ambiguous. Additionally, the speed, magnitude and persistence of the effects can vary by bank, depending on the characteristics of their funding and lending, and the nature of their operations.

When asking what effect low interest rates have on bank profits it is important to consider what would happen to banks' profits if interest rates were unchanged in the face of a weakening economy. Bank profits generally depend on households and businesses having demand for credit and the ability to repay it with interest. If interest rates were kept high while the economy weakened, the capacity of households and businesses to borrow and repay loans would be diminished and banks' profits would ultimately suffer. In this sense, lower interest rates support bank profits because they reduce the negative impact of weaker economic activity.

Graph 1

Policy Rates



Source: National Sources

Net interest margin

The core activity of most banks is lending, and they make money from this by lending at interest rates that are higher than what they pay for their funding. The net interest margin (NIM) (the ratio of net interest income to interest earning assets) is therefore a key indicator of bank profitability. If a decline in policy interest rates results in banks' funding costs declining by less than their lending rates, then NIMs will narrow and bank profits will decline (all else being equal). There are several reasons why this might happen.

The lower bound on deposit rates

As short-term interest rates become very low, a greater share of deposit rates may reach their effective lower bound. The effective lower bound is the limit on how low deposit rates can go. In principle, deposit rates can be negative, but negative rates give customers an incentive to withdraw their deposits from the banking system (e.g. by holding physical cash), and this causes a limit on how low negative deposit rates can go. The cost of moving money out of the banking system is larger for businesses and other large depositors (e.g. the cost of insuring large amounts of cash) so the lower bound on their deposits is further below zero than for household deposits. Rather than charge negative rates, banks can charge fees on deposit accounts, though this still gives customers an incentive to withdraw their deposits.

If lending rates continue to decline when deposit rates have reached their lower bound, then NIMs will narrow. The implications of the lower bound on deposit rates for banks' funding costs depends on the amount and composition of deposit funding. In aggregate, US banks source 80 per cent of their funding from deposits, most of which are from households (Graph 2). By contrast, UK and Swedish banks fund around 40 per cent of their assets with deposits, around half of which is from households. Banks in Denmark fund only around 20 per cent of

their assets with deposits.[1] Non-deposit sources of funding (such as bonds) have more scope to pay negative interest rates, so lower interest rates should have less effect on bank profits in countries with lower deposit shares of funding.

Asset yields

The effect of low rates on banks' NIMs also depends on how banks adjust their lending rates. The degree and speed of adjustment in banks' lending rates depends on their pricing power and the composition of their assets. Banks with more pricing power can ensure the decrease their lending rates is closer to the decrease in their funding costs, leaving their NIMs less affected. Similarly, banks with fixed-rate loans may experience a temporary widening of NIMs when interest rates decline, though in the long run, average lending rates will decline as new loans are written and older loans mature. Banks can also increase their lending rates by lending to riskier borrowers; although this may weigh on future profits if this behaviour leads to higher losses.

Banks' holdings of (low-yielding) liquid assets may increase when interest rates decline, which further lowers their NIMs. In recent years central banks have increasingly used large-scale asset purchases as policy rates have fallen to very low levels. These asset purchases can leave banks with more liquid assets in the form of (low-yielding) deposits at their central bank (Graph 3). The negative effects on asset yields can be mitigated by central bank actions. Some central banks have used 'tiering' of bank reserves, whereby a portion of banks' reserves receive a higher interest rate.[2] Additionally, availability of cheap funding from central banks, including through term lending facilities, also helps to mitigate pressure on banks' NIMs when interest rates are low.

Flattening yield curves

A flatter yield curve can also narrow banks' NIMs. Yield curves do not necessarily flatten when interest rates decline, but can do so, especially when interest rates approach very low levels (Graph 4). This partly reflects that central banks have sought to lower longer-term rates as short-term rates have approached their lower bound. Banks typically borrow short term (e.g. deposits) and lend long term (e.g. mortgages). As such, when yield curves flatten (and the difference between long- and short-term rates declines), banks' NIMs narrow. The narrowing may be delayed for banks whose assets reprice slower than their liabilities.

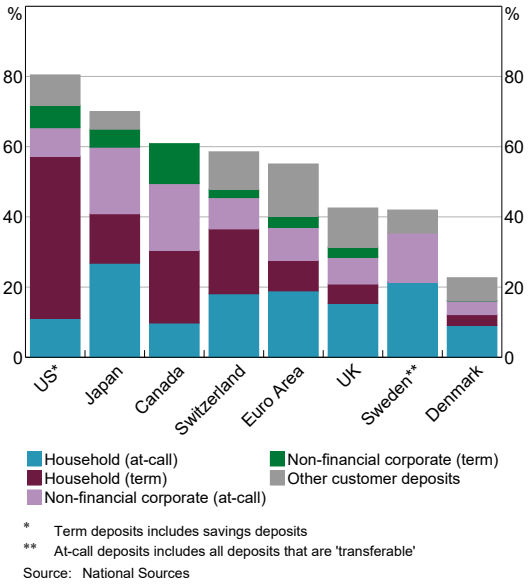
Zero-interest equity funding

A portion of banks' funding is from equity, which bears no interest regardless of the level of interest rates. This limits the extent to which changes in interest rates flows through to bank funding costs and causes NIMs to change with interest rates.[3] Common equity accounts for about 10 per cent of global systemically important banks' funding. As a

Graph 2

Bank Deposit Funding

Per cent of assets



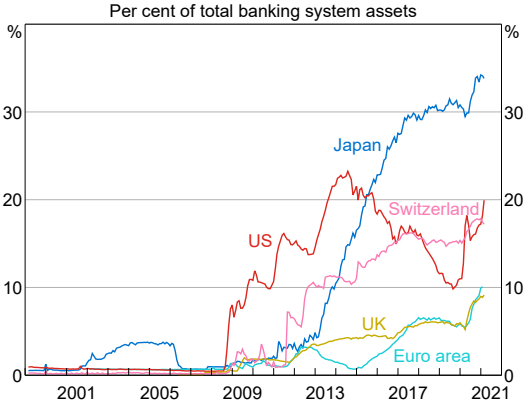
* Term deposits includes savings deposits
** At-call deposits includes all deposits that are 'transferable'

Source: National Sources

Graph 3

Reserves Held at the Central Bank

Per cent of total banking system assets



Sources: BOE; BOJ; ECB; FRED; RBA; Refinitiv; SNB

simplified example, if interest rates on all of a bank's assets and non-equity liabilities fell by 100 basis points, and 10 per cent of funding is from equity, then the NIM would narrow by 10 basis points.

Positive effects of low interest rates on bank profits

Lower interest rates can also increase bank profits in several ways. Lower interest rates support economic growth and reduce interest burdens for indebted households and businesses. Since lower rates contribute to a stronger economy and more resilient households and businesses, they lower banks' impairment expenses both because borrowers are better placed to service their debt and because prices of assets that banks have as collateral should be higher. Lower interest rates also increase demand for credit which supports bank profits. Stronger credit growth and refinancing activity (which typically increases when interest rates fall) also increases banks' fee income. Indeed, Brei, Borio and Gambacorta (2019) find that 'low interest rates induce banks to rebalance their activities from interest-generating to fee-generating and trading activities'. Finally, banks will book capital gains on their holding of financial assets when interest rates decline, though this should be a one-time boost to profits.

Bank profitability in economies with very low interest rates

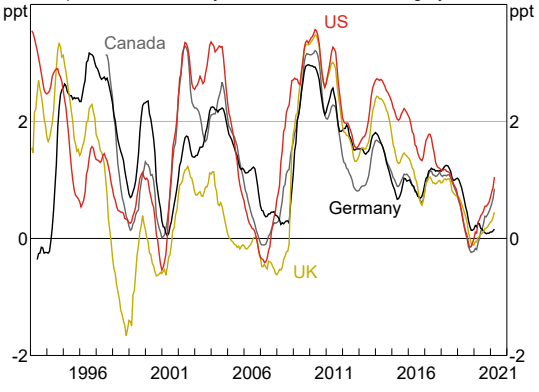
Since the global financial crisis (GFC), some countries have adopted negative policy rates, some have maintained positive but low policy rates and others have maintained rates well above zero. Overall, there is no obvious relationship between change in profitability (measured by the return on assets (ROA)) and interest rates across a sample of advanced economies. Comparing the blue and purple bars in Graph 5, bank profits have decreased in some economies that implemented negative policy rates since the GFC, such as Japan and the euro area. But in others, such as Sweden, Switzerland and Denmark, bank profits have been maintained. Economies that have maintained positive interest rates, such as the United States, Canada and Norway have generally not seen a deterioration in bank profits since the GFC.

Even focusing more narrowly on NIMs, the component of profits that is most directly related to interest rates, there is no clear relationship. In some countries that adopted negative policy rates, such as Japan and Denmark, NIMs narrowed (Graph 6). In Japan's case, this is because deposit rates have been around zero since the early 2000s, while lending rates declined owing to competition between lenders. However, in other jurisdictions that adopted negative rates, such as the euro area, Switzerland and Sweden, the story is less clear. In Switzerland and Sweden, NIMs increased after the GFC until about 2015 as deposit rates declined faster than lending rates. Banks also increased higher-risk (and higher-yielding) residential and commercial property lending over this period. Since 2015, NIMs have declined a little as interest rates fell

Graph 4

Sovereign Yield Curve Slopes

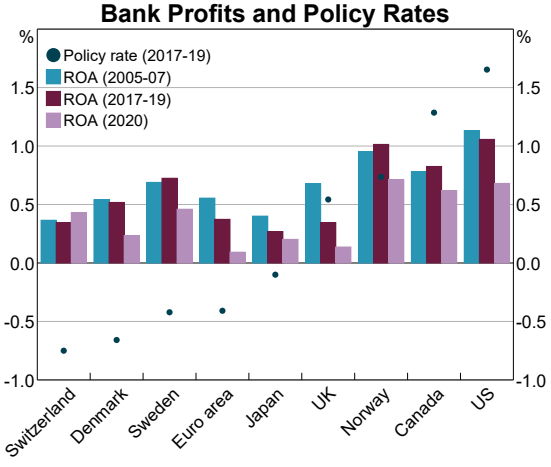
Spread between 10-year and 3-month sovereign yields



Source: Bloomberg

Graph 5

Bank Profits and Policy Rates



Sources: National sources; S&P Global Market Intelligence

further below zero and banks were reluctant to pass these declines through to deposit rates. In the euro area, NIMs were broadly flat up until 2019. This reflects that euro area banks were able to match a decline in their lending rates with lower deposit rates, including by introducing negative deposit rates in some cases (see 'Negative deposit rates' section below).

In 2020, NIMs declined sharply for most advanced economy banks. This reflects a combination of factors, including greater holdings of low-yielding assets such as central bank reserves (see Graph 3), and a sharp flattening of yield curves (See Graph 4).

In countries that maintained positive but low policy rates, NIMs have generally been little changed since the GFC. However, as interest rates declined sharply in 2020, NIMs also declined, especially in the United States.

Negative deposit rates

European banks have increasingly charged negative interest rates on their deposits over the past couple of years. According to the European Central Bank (ECB), 7 per cent of at-call retail banking deposits in the euro area were subject to negative interest rates as of November 2020 (ECB 2020).[4] The share of euro area retail term deposits with negative interest remained negligible, but banks have benefited from a continued shift of deposits into at-call accounts (Graph 7). In Denmark, the average outstanding interest rate on household term deposits reached −15 basis points in January 2021.

Using confidential data, Altavilla *et al* (2019) report that in the euro area one-quarter of non-financial corporate deposits had a negative deposit rate as of late 2019. However, most accounts incurred only small negative interest rates at the time. More timely, though less detailed, public data indicate that average rates on new corporate term deposits declined to −30 to −40 basis points or lower in some euro area economies in late 2020, including Belgium, Germany, the Netherlands and Spain. New interest rates on corporate deposits in Switzerland and Denmark have recently reached −40 and −50 basis points.

Smaller banks

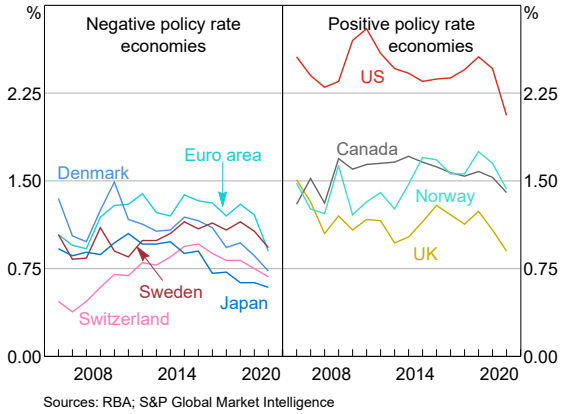
The discussion so far has focused on aggregate profitability, which is dominated by large banks. Comparing aggregate with median outcomes indicates the extent to which the aggregates have been driven by factors specific to large banks. For example, smaller banks tend to use more deposit funding, and their NIMs might compress more when interest rates decline because of the effective lower bound on deposit rates.

The median change in ROA was larger (more negative) than the change in the aggregate for several economies that adopted negative interest rates, indicating that smaller banks have seen a larger decline in profits. In particular, prior to COVID-19, the median ROA in the euro area, Japan, Denmark and Switzerland had contracted by roughly 25–30 basis points relative to the GFC, compared to smaller contractions in the weighted-

Graph 6

Net Interest Margins

Ratio of net interest income to total assets

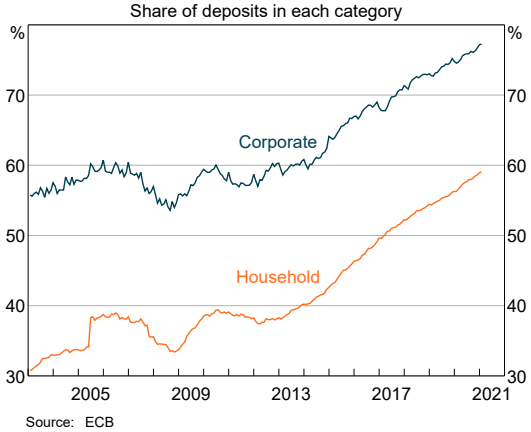


Sources: RBA; S&P Global Market Intelligence

Graph 7

Euro Area At-call Deposits

Share of deposits in each category



Source: ECB

average ROA (Graph 8). However, Sweden had the opposite outcome. The evolution of smaller banks' profitability was more similar to that of large banks in positive policy rate economies.

The under-performance of smaller banks in negative interest rate economies partly reflects that their NIMs have declined relative to larger banks (Graph 9). The sharper fall in smaller banks' NIMs following the GFC mostly occurred after policy interest rates first turned negative in 2014. Smaller banks use more household deposit funding. They also tend to have lower pricing power for lending compared with large banks, and so have not been able to raise lending margins to offset pressure on their NIMs.

Smaller banks have attempted to offset the narrowing in their NIMs by cutting operating costs and/or increasing fee income. For example, smaller Danish banks have increased their fee and commission income from 1 per cent to 2 per cent of assets, on average.

What are the estimates of the causal effects of low interest rates on banks' profitability?

Over the past decade, a growing range of single- and cross-jurisdiction studies have attempted to estimate the causal effect of interest rates on bank profitability, holding other factors constant. Causal effects are commonly estimated with panel regressions, tracking data on multiple banks through time. In these regressions, bank profitability is regressed against the short-term interest rate and yield curve slope. Other variables are also included to control for both individual bank characteristics and macroeconomic conditions that influence bank profitability.

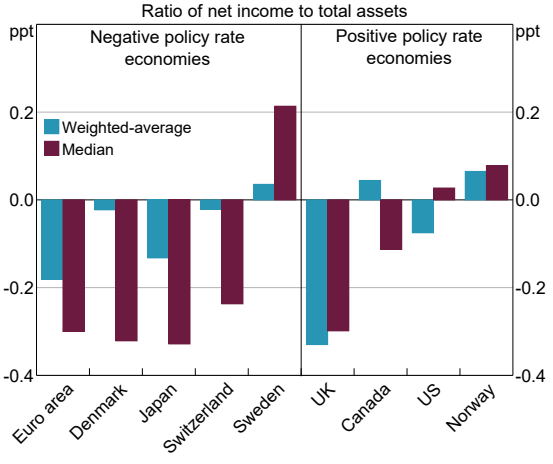
Despite the commonality in the approach, there are a range of findings in the literature. Several papers find modest effects of lower interest rates on bank profitability. For example, Alessandri and Nelson (2015) find that for UK banks, a 100 basis point fall in interest rates is associated with a 4 basis points contraction in ROA after one quarter. Busch and Memmel (2015) find that a 100 basis point fall in the level of interest rates is associated with a 7 basis point contraction in the NIMs of German banks. However, Borio and Gambacorta (2017) find large effects of interest rates on the profitability of large advanced economy banks. They estimate that a 100 basis point fall in interest rates is associated with a 25 basis point fall in banks' ROA after one year, with this effect increasing up to 40 basis points when interest rates are very low. The profitability of smaller, less diversified and more deposit-funded banks is more negatively affected by low interest rates (Lopez, Rose, and Spiegel 2018 and Deutsche Bundesbank 2017).

In contrast, other papers find a negligible effect of interest rates changes on bank profitability. For example, Genay and Podjasek (2014) and Bikker and Vervliet (2017) both find that lower interest rates have a negligible effect on US banks' profitability,

Graph 8

Change in Profitability*

Ratio of net income to total assets



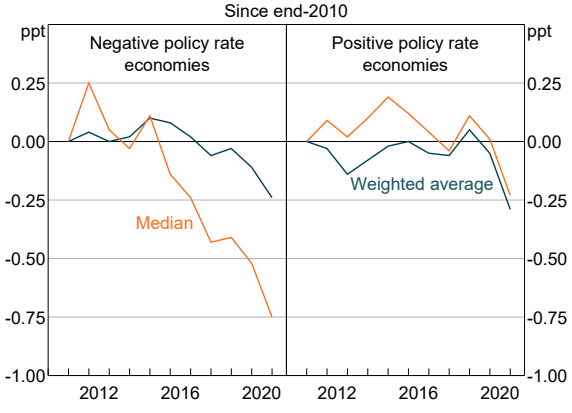
* Change from pre-GFC average (2005-07) to pre-Covid average (2017-19)

Sources: RBA; S&P Global Market Intelligence

Graph 9

Change in NIMs

Since end-2010



Source: S&P Global Market Intelligence

mainly because higher fees and lower loss provisions offset downward pressure on NIMs.

A prolonged period of low rates is found by several studies to have a larger negative effect on bank profits. For example, Claessens, Coleman, and Donnelly (2018) find that ROA is 25–30 basis points lower after being in a low interest rate environment for 4 years. Similar results are found in ECB (2020). These results emerge because the negative effect of low interest rates on NIMs is very persistent, and is estimated to outweigh the positive effects on other components on bank profits (some of which are temporary) (Brei *et al* 2019).

Altavilla, Boucinha and Peydró (2018) argue that many studies in this area could be biased because they don't fully account for the common effect of GDP on bank profits and interest rates. They include macroeconomic forecasts as additional controls and find no robust association between interest rate changes and euro area banks' profitability in the short run. A similar result was found by Stráský and Hwang (2019). Altavilla *et al* (2018) do find that profitability is lower during prolonged periods of low interest rates, but the estimated effect is small – about 2½ basis points for each additional year in a low interest rate environment. The authors also argue that this effect is likely outweighed by the positive effects of lower interest rates on the macroeconomy.

In recent years more studies have focused specifically on the effect of negative rates on bank profitability. Turk (2016) and Basten and Mike (2018) find that banks' profitability has been resilient following the introduction of negative interest rates, at least in the short- to medium-term. Rostagno *et al* (2019) also estimate that euro area bank profitability would have been lower in counterfactual scenarios in which the policy interest rate was non-negative. By contrast, Beauregard and Spiegel (2020), Urbschat (2018) and Eggertsson (2019) find that negative interest rates negatively affect banks' profitability in the longer run, partly because of banks' limited ability to pass along negative rates to depositors or otherwise adjust their business models. These papers are consistent with studies that find that the introduction of negative interest rates has negatively affected bank share prices, which contain within them expectations of long-run bank profitability (Ampudia and van den Heuvel 2019; Bats, Giuliodor and Houben 2020; Hong and Kandrac 2018).

Overall, the available evidence indicates that lower interest rates typically have a negligible to modest negative effect on bank profitability in the short run. This is at least partly because of the positive effect that lower interest rates have on economic growth and banks' asset quality, which offsets the negative effects of lower interest rates on NIMs. However, there is evidence that bank profitability falls further when interest rates are at low levels and remain low for a prolonged period. Smaller banks' profitability is also more sensitive to lower interest rates, both in the short and longer run.

Conclusion

International experience since the GFC has not borne out a clear relationship between interest rates and bank profits across jurisdictions. Some economies that have adopted negative interest rates have seen their banks maintain profits, while others have seen profits decline. The growing literature on the topic provides some common conclusions. In the short run, most studies find at most a modest negative effect of lower interest rates on bank profits in aggregate, but larger effects for smaller banks. However, some authors (such as Altavilla *et al* 2018) have raised concerns about the approaches taken in these studies and argue that the effects are negligible, particularly in the short term. There is stronger evidence that bank profits decline in prolonged low interest rate environments.

Footnotes

[*] The authors are from Financial Stability Department and would like to thank Eva Liu, Troy Gill for work on an earlier version of this article as well as Eden Hatzvi.

[1] Denmark's low share of deposit funding reflects that about half of the banking system's assets are with mortgage banks, which have no deposits but receive funding from households indirectly through Danish pension funds.

[2] Advanced economies that have implemented tiered reserve remuneration systems include Japan, Norway, Switzerland, Denmark and the euro area.

[3] Although equity funding does not bear interest, banks need to deliver returns to equity holders to prevent their share prices from declining. The level of returns to shareholders needed to maintain share price is known as the 'cost of equity'.

[4] See ECB (European Central Bank) (2020) 'Financial Stability Report'. Available at <https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202011_02~c984477181.en.html#toc4>.

References

Alessandri P, BD Nelson (2015) 'Simple Banking: Profitability and the Yield Curve', Journal of Money Credit and Banking, Volume 47, Issue 1, February 2015, pp 143–175.

Altavilla C, L Burlon, M Giannetti and S Holton (2019). 'Is there a zero lower bound? The effects of negative policy rates on banks and firms,' Working Paper Series 2289, European Central Bank.

Altavilla C, M Boucinha and J Peydró (2018), 'Monetary policy and bank profitability in a low interest rate environment', Economic Policy, Volume 33, Issue 96, October 2018, pp 531–586.

Ampudia M and S Heuvel (2019), 'Monetary Policy and Bank Equity Values in a Time of Low and Negative Interest Rates' Finance and Economics Discussion Series 2019-064, Board of Governors of the Federal Reserve System (U.S.).

Basten C and M Mariathasan (2018), 'How Banks Respond to Negative Interest Rates: Evidence from the Swiss Exemption Threshold' CESifo Working Paper Series 6901.

Bats J, M Giuliodor and A Houben (2020) 'Monetary policy effects in times of negative interest rates: What do bank stock prices tell us?' DeNederlandscheBank Working Paper No. 694 October 2020

Beauregard R and MM Spiegel (2020), 'Commercial Banks under Persistent Negative Rates' FRBSF Economic Letter September 28, 2020.

Bikker JA and TM Vervliet (2017), 'Bank profitability and risk - taking under low interest rates', Volume23, Issue1, January 2018, pp 3–18.

Borio C and L Gambacorta (2017), 'The influence of monetary policy on bank profitability' International Finance. 2017; 20:48–63.

Brassil A, J Cheshire and J Muscatello (2018), 'The Transmission of Monetary Policy through Banks' Balance Sheets' RBA Conference Paper 2018 <https://www.rba.gov.au/publications/confs/2018/pdf/rba-conference-volume-2018-brassil-cheshire-muscatello.pdf>.

Brei M, C Borio and L Gambacorta (2019), 'Bank intermediation activity in a low interest rate environment' BIS Working Papers No 807.

Brunnermeier MK and Y Koby (2017), 'The 'Reversal Interest Rate': An Effective Lower Bound on Monetary Policy', Working Paper.

Busch R and C Memmel (2015), 'Banks' net interest margin and the level of interest rates', Deutsche Bundesbank Discussion Papers No 16/2015.

Claessens S, N Coleman and M Donnelly (2018), '"Low-For-Long" interest rates and banks' interest margins and profitability: Cross-country evidence' Journal of Financial Intermediation, 2018, vol. 35, issue PA, pp 1–16.

Deutsche Bundesbank (2017), 'The performance of German credit institutions in 2016', Monthly Report September 2017.

ECB (European Central Bank) (2020), 'Financial Stability Review', November 2020.

Eggertsson GB, RE. Juelsrud, L H Summers and EG Wold (2019), 'Negative Nominal Interest Rates and the Bank Lending Channel', NBER Working Paper 25416.

Genay H and R Podjasek (2014), 'What Is the Effect of a Low Interest Rate Environment on Bank Profitability?' Chicago Fed Letter, 2014, issue Jul, No 324.

Hong GH, J Kandrac (2018), 'Pushed Past the Limit? How Japanese Banks Reacted to Negative Interest Rates', IMF Working Paper No. 18/131.

Lopez JA, AK Rose and MM Spiegel (2018), 'Why Have Negative Nominal Interest Rates Had Such a Small Effect on Bank Performance? Cross Country Evidence', NBER Working Paper 25004, September 2018.

Rostagno M, C Altavilla, G Carboni, W Lemke, R Motto, AS Guilhem, J Yiangou (2019), 'A tale of two decades: the ECB's monetary policy at 20', ECB Working Paper No 2346 December 2019.

Stráský J and H Hwang (2019), 'Negative interest rates in the euro area: does it hurt banks?' OECD Economics Department Working Papers 1574, OECD Publishing.

Turk R (2016), 'Negative Interest Rates: How Big a Challenge for Large Danish and Swedish Banks?', IMF Working Paper No. 16/198.

Urbschat F (2018), 'The Good, the Bad, and the Ugly: Effect of Negative Interest Rates and QE on the Profitability and Risk-Taking of 1600 German Banks,' CESifo Working Paper Series 7358, CESifo.

Underemployment in the Australian Labour Market

Mark Chambers, Blair Chapman and Eleanor Rogerson[*]

Photo: Marko Novkov/EyeEm – Getty Images

Abstract

Underemployment in Australia has been moving higher for several decades. This article reviews the trends that have been driving this, including the long-run increase in part-time employment and changes in how the labour market adjusts to fluctuations in labour demand. The article also discusses the implications of the upwards trend in the underemployment rate for assessing spare capacity in the labour market. One implication is that the unemployment rate may need to decline by more than has previously been the case before wage pressures start building strongly.

Introduction

Historically, the unemployment rate has been used as the key indicator for measuring spare capacity in the labour market. However there is growing evidence that the underemployment rate – the share of workers in the economy who want and are available to work additional hours – has increased in importance as a measure of spare capacity. Underemployed workers represent additional labour supply that can be called upon before there is upward pressure on wages. Underemployment also affects the welfare of Australians, if increasing underemployment indicates that an increasing number of workers are not able to earn enough income to satisfy their needs.[1]

Underemployment in Australia has been increasing for several decades, driven by both structural and cyclical factors; in contrast, over the same period the unemployment rate has fluctuated but has broadly moved lower (Graph 1). In this article, we discuss the factors that have shaped the path of the underemployment rate in Australia over recent decades, how people transition in and out of underemployment, and what this means for assessing spare capacity in the Australian labour market.

What is underemployment and how is it measured?

An underemployed person is someone who is currently employed, but who would like and is available to work additional hours.[2] In particular, despite having one or more jobs, there is a shortfall between that person's preferred number of hours and their actual hours worked. In this article we term employed people without such a shortfall in hours as 'sufficiently employed', though some might be 'over-employed', working more hours than they would prefer (allowing for the lower income involved in reducing hours).

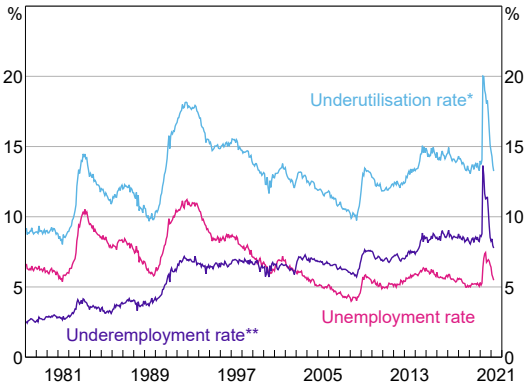
Underemployment is also different from unemployment, since, even when an underemployed person is working zero hours (for instance, due to being temporarily stood down), they are still classified as employed because they have an existing connection to at least one employer. But, like unemployment, underemployment represents additional hours of labour supply that are available from the current labour force. Measures of underemployment are therefore important complements to the unemployment rate in assessing how much labour market spare capacity could be called upon to increase production of goods and services in the economy.

The Australian Bureau of Statistics (ABS) headline measures of underemployment capture 2 groups of people:

Graph 1

Heads-based Labour Underutilisation Rates

Share of labour force



* The underutilisation rate adds together the unemployment and underemployment rates

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

Sources: ABS; RBA

- part-time workers (defined as those who usually work less than 35 hours a week) where the hours worked in a given reference period are below their preferred hours, and they are available for those additional hours (Figure 1)
- full-time workers (defined as those who usually work 35 hours a week or more) who worked less than 35 hours during the reference week because they had insufficient work or were stood down; someone who is working at least 35 hours per week is not categorised as underemployed, even if they want additional hours.[3]

These definitions mean that headline measures capture only underemployment for people who are working fewer than 35 hours a week, which is much more common for part-time than full-time workers. On the other hand, an underemployed full-time worker is typically seeking to be restored to full-time work, and so wants a larger amount of additional hours than does a part-time worker; on average over 2015 to 2019, underemployed full-time workers sought an additional 22 hours of labour (about 3 days per week), while part-time workers sought around 15 hours (or 2 days) of extra work.

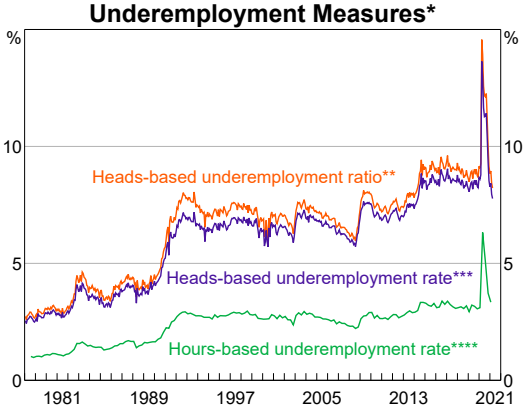
The ABS collects information on underemployment as part of its monthly Labour Force Survey. A *heads-based* measure of the underemployment rate is calculated as the number of underemployed people as a share of the labour force, the latter being the number of people who either are employed or are unemployed (Graph 2). Underemployment can also be reported as the number of underemployed people as a share of all employed persons – termed an underemployment ratio. Heads-based measures count all underemployed people the same, irrespective of differences in the shortfall in preferred hours. Alternative measures that account for the additional hours available from underemployed people are known as *volume* or *hours-based* measures.

The heads-based underemployment rate has trended up over time, and has been around historically high levels for several years (looking through the pandemic-related spike in 2020). The hours-based measure has also moved higher over

the past 10 years, although to a lesser extent. In April 2021 the heads-based underemployment rate was 7.8 per cent; that is, nearly 1.1 million people were underemployed, out of the total labour force of a little under 14 million people. Of these, around 1 million were part-time underemployed people, which was around one-quarter of all part-time workers. Full-time workers typically comprise only a small share of total underemployment; 2020 was an exception, as discussed in Box A.

Graph 2

Underemployment Measures*



* Full-time workers on part-time hours for economic reasons and part-time workers who would like, and are available, to work more hours
** Share of employed persons
*** Share of the labour force
**** Share of potential hours (sum of hours sought by the unemployed, additional hours sought by the underemployed, and hours usually worked by all employed persons; there are some inconsistencies in the calculation over time due to data availability)

Sources: ABS; RBA

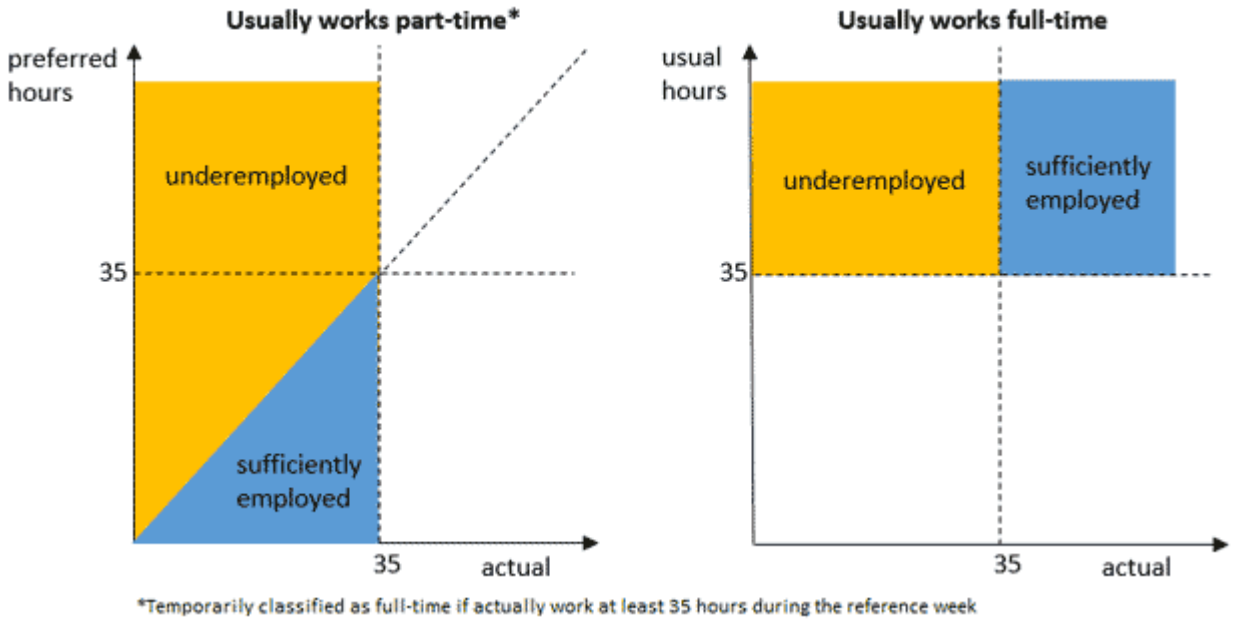
What has driven the increase in underemployment in Australia?

Structural changes in Australia's labour market over the past 40 years have been an important part of the increase in underemployment. In particular, for much of this period, the share of part-time employment has been increasing. More recently, employers have increasingly tended to adjust their workforce by changing the hours of existing employees, rather than changing headcount. This has also contributed to the increase in underemployment.

Underemployment and the increase in part-time employment

Over the past 40 years the share of part-time employment has roughly doubled, from around 15 per cent of total employment in the late 1970s, to around one-third at present (Graph 3). This has been a key driver of the longer-run increase in the underemployment rate since, on average, the share of part-time workers who are underemployed has been much higher than for full-time workers. The long-run average underemployment ratio is around 25 per cent for part-time workers, but only around 1 per cent for full-time workers; as discussed above, this largely reflects differences in how

Figure 1: Underemployment – actual and preferred hours



*Temporarily classified as full-time if actually work at least 35 hours during the reference week

underemployment is measured for part-time and full-time workers.

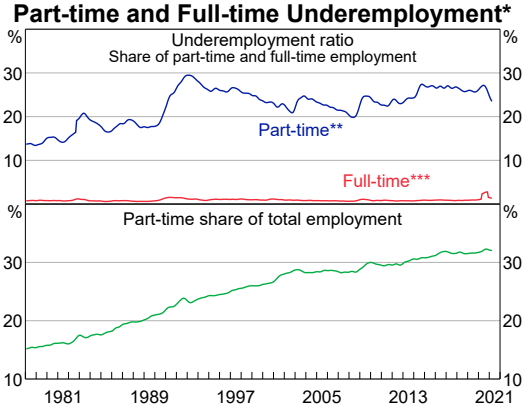
Decomposing movements in underemployment reveals that around half of the increase since the early 1980s has been due to the gradual upwards trend in the share of part-time employment. This is shown in Graph 4 as the 'between effect' – changes *between* the relative shares of full-time and part-time employment in Australia's labour market.[4] Importantly though, the remaining half of the cumulative change over the past 4 decades has been due to changes in the prevalence of underemployment *within* the groups of full-time and part-time employees; this more variable component of underemployment is discussed further below.

Underemployment is not evenly distributed across industries, which has implications for how the effects of underemployment are distributed across the community. Unsurprisingly, industries with higher levels of part-time employment have higher levels of underemployment (Graph 5). Underemployment is most prevalent in the 'accommodation & food services', 'arts & recreation services' and 'retail trade' industries, which all have relatively high part-time shares of employment (around 50 per cent in 2019).[5] Around half of all underemployment in 2019 was attributable to the 'accommodation & food services', 'retail trade' and 'health care & social assistance' industries.

Increases in underemployment have been widespread across age and sex cohorts over the past 10 years, but with larger increases for younger workers (15–24 year olds) (Graph 6). Females are more likely to be underemployed than males. The presence of children under 14 years of age in a household is associated with a higher rate of underemployment for females but a lower rate for men. Younger workers are more likely to report being underemployed than older cohorts. As discussed in Dhillon and Cassidy (2018), there has been a notable increase in underemployment and involuntary part-time work for younger workers

Graph 3

Part-time and Full-time Underemployment*

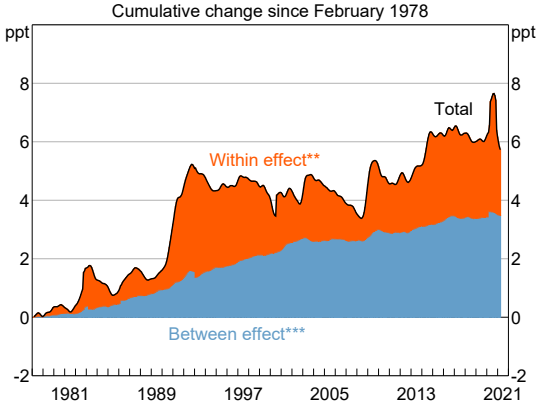


* Trend estimates
** Part-time workers who would like, and are available, to work more hours
*** Full-time workers on part-time hours for economic reasons
Sources: ABS; RBA

Graph 4

Changes in the Underemployment Ratio*

Cumulative change since February 1978

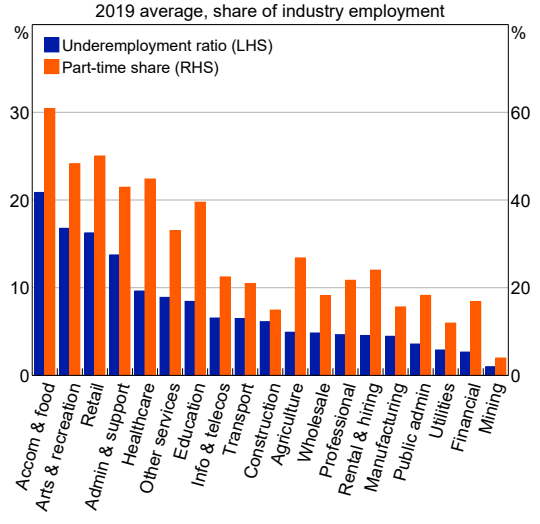


* Trend estimates
** Effect of changes in the share of underemployment within full-time and part-time employment
*** Effect of changes in the shares of full-time and part-time employment in the labour market
Sources: ABS; RBA

Graph 5

Underemployment by Industry

2019 average, share of industry employment



Sources: ABS; RBA

since 2014. These authors suggest that a decline in the rate at which tertiary educated graduates transition from part-time to full-time employment over this period may have contributed to this increase.

Occupations with more underemployment are typically associated with high-underemployment *industries*. Over the past decade underemployment has increased most for people working in sales roles or as labourers (who are employed in several industries, including construction, hospitality and transport), and to a lesser extent in community & personal services jobs (Graph 7). These occupations also tend to be associated with lower skill levels.

Appendix A provides some additional descriptive statistics for underemployed people compared with other groups in the labour force.

Underemployment, cyclical labour market conditions and hours adjustments

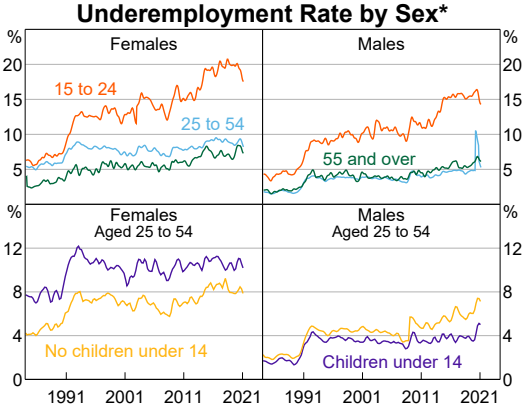
Although growth in the part-time share of employment has been an important driver of underemployment, it does not explain all of the increase over time, nor does it explain any of its periodic fluctuations. An additional important driver has been movements in underemployment *within* part-time workers as a group, which in turn is shaped by broader labour market conditions (Graph 8).

Increases in the share of part-time workers who are underemployed have been particularly pronounced around periods of broader labour market slowdowns and weaker economic conditions. In these episodes, the share of part-time underemployment begins to increase when the labour market slows, generally reaching a peak around the same time as the unemployment rate. Part-time underemployment generally does not recover as quickly as unemployment when the labour market begins to improve, but does eventually come down.

The speed and extent of adjustments in the underemployment rate have changed as broader characteristics of the labour market have changed. In the slowdowns seen in 2008 and 2012–14, part-time underemployment increased by around 5 percentage points in each case (as employee hours were cut), while the unemployment rate only increased by 1½–2 percentage points (as the

Graph 6

Underemployment Rate by Sex*

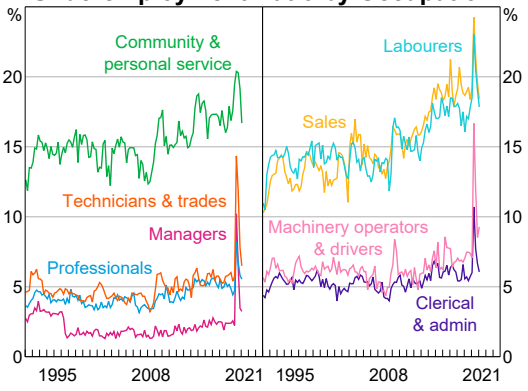


* Trend estimates

Sources: ABS; RBA

Graph 7

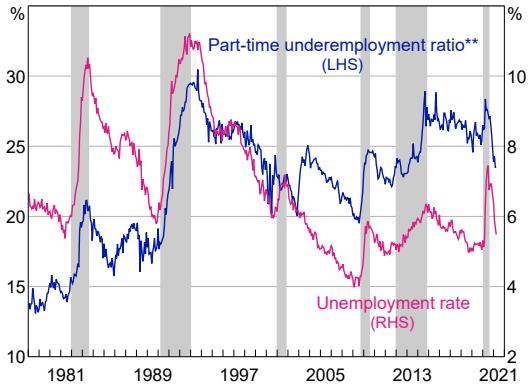
Underemployment Ratio by Occupation



Sources: ABS; RBA

Graph 8

Underemployment and Labour Market Downturns*



* Shading indicates labour market downturns, from trough to peak in unemployment rate

** Share of part-time employment that is underemployed

Sources: ABS; RBA

number of employees was reduced). In comparison, the 1990s downturn saw a smaller increase in part-time underemployment relative to the change in unemployment.

This change in how underemployment adjusts to labour market cycles is likely in part because flexible work arrangements (including part-time employment) have become more widespread as businesses have looked to improve how they can respond to changes in economic conditions. In particular, businesses have increasingly looked to adjust labour inputs through hours worked rather than total employee numbers; for further discussion of these trends see, for example, Bishop, Gustafsson and Plumb (2016) and Heath (2018). At the same time, more employees have also looked for working arrangements with greater flexibility than standard full-time employment would traditionally permit.

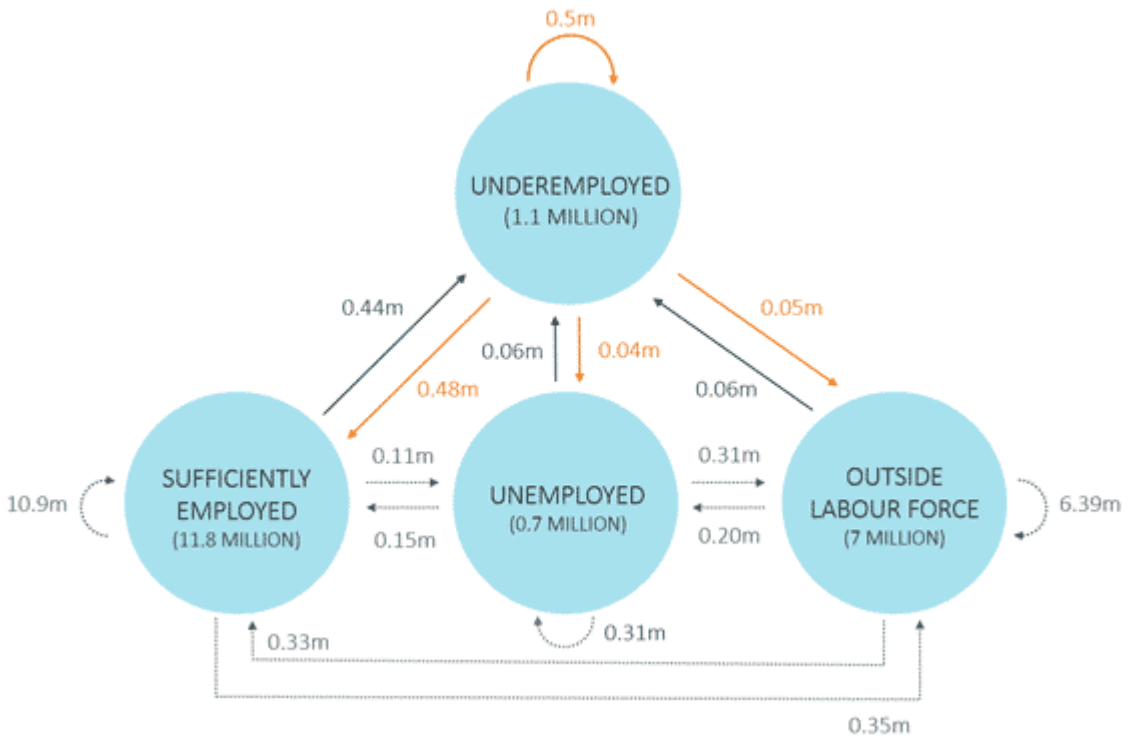
Reflecting the growing importance of hours adjustments as a mechanism for employers to manage labour inputs, the magnitude of flows in and out of underemployment are relatively large compared with other types of labour market flows.

Figure 2 shows the average size of flows per quarter in 2019. Most transitions in and out of underemployment were people leaving or joining the group of sufficiently employed workers (2019 is used as a reference period, given the significant disruptions to the labour market in 2020 caused by the COVID-19 pandemic).[6] On average during 2019, around three-quarters of people who became underemployed did so after having most recently been sufficiently employed. Around half of people who became sufficiently employed did so by exiting the pool of underemployed people, rather than being drawn in from the pool of non-employed people (whether previously unemployed or outside the labour force).

Labour market slowdowns tend to both increase the likelihood of becoming underemployed and reduce the likelihood of exiting underemployment. The probability of moving from sufficient employment to underemployment increased relatively sharply in the 1990s recession and the Global Financial Crisis (GFC), only gradually moving lower in periods of labour market strengthening such as

Figure 2: Labour Market Status – Size and Flow

Quarterly; 2019 average[7]



the mid 2000s (Graph 9). More broadly, there has been a steady increase over time in the probability of transitioning from sufficient employment to underemployment, consistent with the gradual increase in overall underemployment. In the other direction, in recent years a little over 40 per cent of people who reported being underemployed were sufficiently employed 3 months later, and about half had sufficient work 6 months later.[8] These probabilities are lower than in the mid 2000s, when broader labour market conditions had been very strong.

Importantly, these movements in and out of underemployment generally involve changes in actual hours worked, rather than simply changes in preferred hours. Around one-third of people who become underemployed lose hours of work involuntarily without changing their preferred hours; a further one-third lose hours involuntarily while also increasing their preferred hours. The remaining one-third increase their preferred hours but do not lose any hours. These increases in preferred hours also add to the amount of underutilised hours available in the labour force.

In the other direction, around two-thirds of people who became sufficiently employed gained extra hours of work; the remaining one-third did not gain hours but reduced their preferred hours and so no longer had a recorded shortfall in hours worked. Across all groups of underemployed people who subsequently became sufficiently employed, between 2015 and 2019 the average increase in hours worked was about 8.5 hours, or a little over a day of work per week (Graph 10). This is broadly indicative of the average additional hours (and hence the average spare capacity) that could be supplied by an underemployed person.

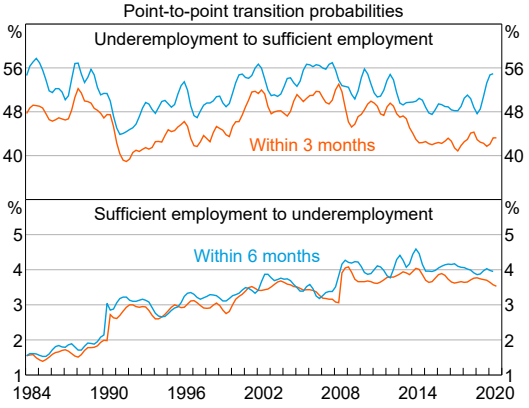
That said, within the group of people transitioning from underemployment to sufficient employment, some people reduce their preferred hours as well as gaining hours. Around one-quarter of underemployed people who became sufficiently employed gained more hours of work and also reduced the number of hours they preferred, by around 3½ hours on average. This suggests the preferred hours they report while underemployed may not reflect their true availability (since, after gaining some extra hours, they downwardly adjust their preferred hours), and volume-based (hours) measures of underemployment may overstate available labour hours to some extent.

The gradual decrease in average additional hours worked when transitioning to sufficient employment is partly because of the increase in the share of part-time workers (whose average hours are lower). As well, over time the average hours worked by part-time underemployed people have been increasing, meaning they have been 'less underemployed' prior to subsequently becoming sufficiently employed. These trends are consistent with the relative stability in the hours-based measure of underemployment since the 1990s, even as the heads-based measure of

Graph 9

Underemployment and Sufficient Employment*

Point-to-point transition probabilities



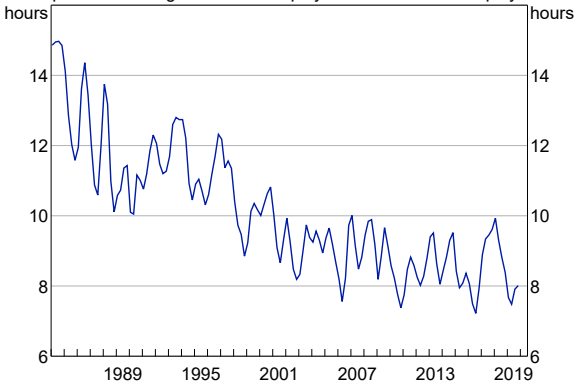
* Sample has been adjusted for attrition; trend estimates; transition probabilities are calculated as flow from status A to status B divided by stock of status A

Sources: ABS; RBA

Graph 10

Change in Average Hours Worked*

People transitioning from underemployment to sufficient employment

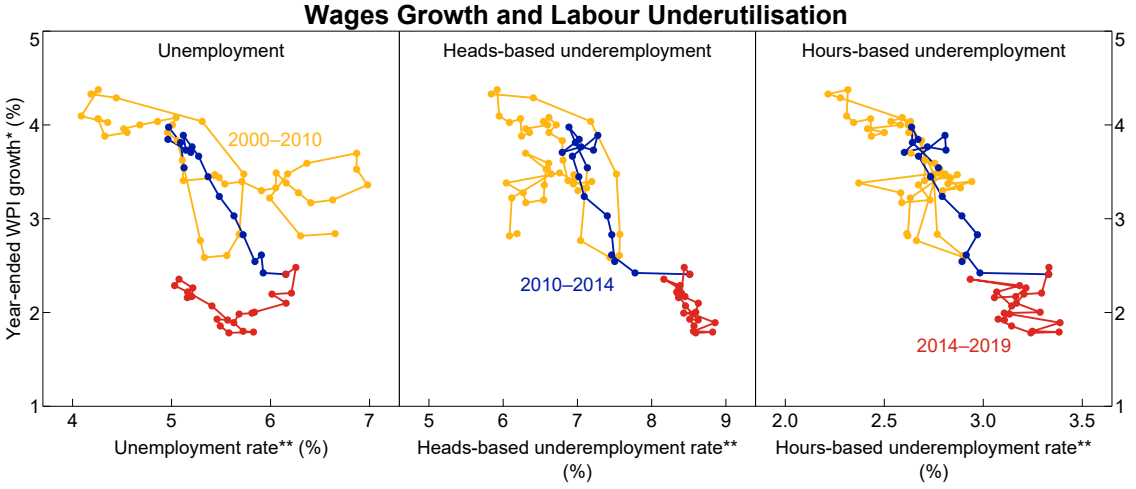


* Trend estimate; 3-month point-to-point change

Sources: ABS; RBA

Graph 11

Wages Growth and Labour Underutilisation



* Private; excluding bonuses and commissions
** Quarterly average
Sources: ABS; RBA

underemployment has moved higher; each underemployed person has on average represented a declining amount of underutilised hours.

Underemployment, labour market spare capacity and wages

Given the willingness of underemployed workers to work additional hours, underemployment clearly represents an amount of potential labour supply that can be drawn on without an increase in measured employment.[9] Importantly, these are additional hours that people are prepared to work at prevailing wage levels; employers may not need to increase wages in order to source additional labour supply. Underemployed workers may also, in the first instance, be looking to increase hours or maintain flexibility in working hours rather than bargain over wages.

The importance of underemployment as a factor shaping wage outcomes has been receiving increased attention among policymakers and researchers (Lowe 2019). Internationally, Hong *et al* (2018) find that, across developed economies, involuntary part-time employment appears to have weakened wages growth and represents additional slack in the labour market. Similarly, Bell and Blanchflower (2021) find that some measures of underemployment have been a better predictor of wages growth than the unemployment rate since the GFC in a number of countries, including the United Kingdom and the United States.

The move higher in underemployment in Australia over the past decade or so appears to have had some relationship with observed wages outcomes over this period; higher rates of underemployment have generally been associated with slower rates of wages growth (Graph 11). In contrast, there has been a less clear relationship between wages growth and changes in the unemployment rate, particularly in more recent years. Recent discussions of the Australian experience include Bishop and Cassidy (2017), Chua and Robinson (2018) and Treasury (2017).

Because of the additional spare capacity represented by an increase in underemployment, observed wages growth may be slower for a given level of the unemployment rate. The increase in the underemployment rate has therefore likely contributed to various researchers' finding that the level of unemployment consistent with stable wages and inflation has declined over the past 15 years or so in Australia; see discussions in Cusbert (2017) and Ruberl *et al* (2021). Abstracting from other changes that have occurred in the economy, the upwards trend in the underemployment rate may mean that the unemployment rate would need to decline by more than has previously been the case before wage pressures start building

strongly; certainly this was the pre-pandemic experience for a number of other advanced economies; see discussions in Arsov and Evans (2018) and Ruberl *et al* (2021).

Conclusion

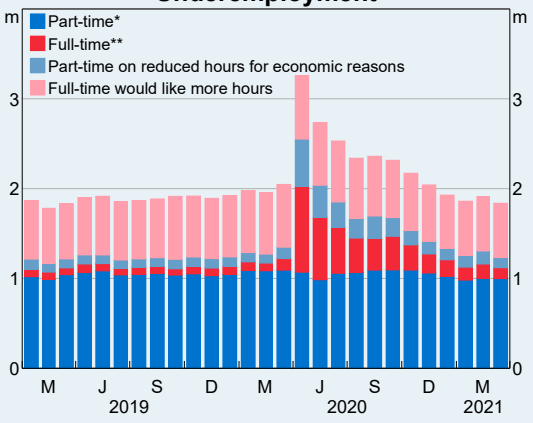
An elevated level of underemployment will generally imply that there is spare capacity that would need to be absorbed before the labour market is sufficiently tight to induce strong wages growth. Moreover, adjustments to underemployment may occur separately from any adjustment to unemployment, if increases in aggregate labour demand are met by additional hours from existing employees. Assessments of spare capacity in the labour market therefore need to have regard to both unemployment and underemployment.

However, interpreting movements in underemployment is not straightforward, given structural changes in the labour market. Even with measures of underemployment returning to pre-pandemic levels, underemployment remains elevated compared with earlier decades. The Bank will continue to closely monitor developments in underemployment as an indicator of spare capacity in the Australian economy.

Box A: The COVID-19 Pandemic and Underemployment

The onset of the COVID-19 pandemic in Australia in March 2020 had extremely large effects on the labour market. Activity restrictions and precautionary behaviour meant many businesses closed or operated at reduced capacity. By April 2020, a large number of people had lost employment or had their hours reduced; wage freezes and cuts were also used extensively by employers in the face of the sudden decline in activity. Government policy measures, including the introduction of the JobKeeper wage subsidy, meant many people who otherwise might have lost their jobs were able to remain attached to their employer.[10] Many of these people, however, worked zero or reduced hours; reductions in work hours were also experienced by many workers at firms that did not receive the JobKeeper wage subsidy. By April 2020 the headline number of underemployed people had increased by 700,000 compared with the end of 2019; using broader measures of underemployment, more than 1 million additional people were working reduced hours (Graph A1).

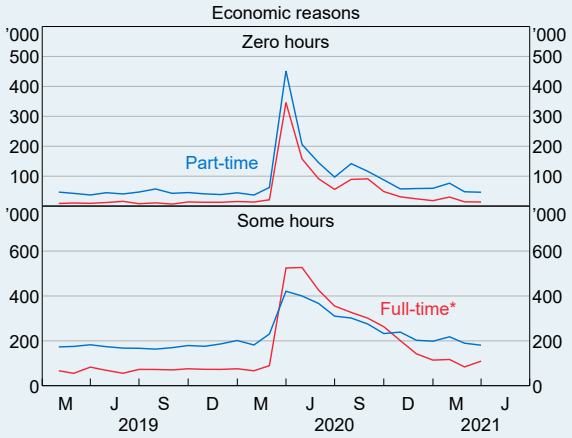
Graph A1
Underemployment



* Part-time workers who would like, and are available to, work more hours; includes part-time on reduced hours who also want more hours than usual
** Full-time workers on part-time hours for economic reasons
Sources: ABS; RBA

Unlike the pattern of large labour market downturns seen over recent decades – where part-time workers experienced a larger increase in underemployment than full-time workers – an unusually large part of the increase in underemployment in 2020 was because of an increase in the number of full-time workers on reduced hours for economic reasons. In April 2020, around 420,000 full-time workers had their hours cut to zero, and an additional 520,000 worked part-time-hours because they were stood down or had insufficient work (Graph A2). Around 870,000 part-time workers also worked fewer hours than usual. The headline underemployment rate increased sharply, from 8.6 per cent in February to 13.6 per cent in April, the highest rate in the history of this series.

Graph A2
Less Than Usual Hours Worked

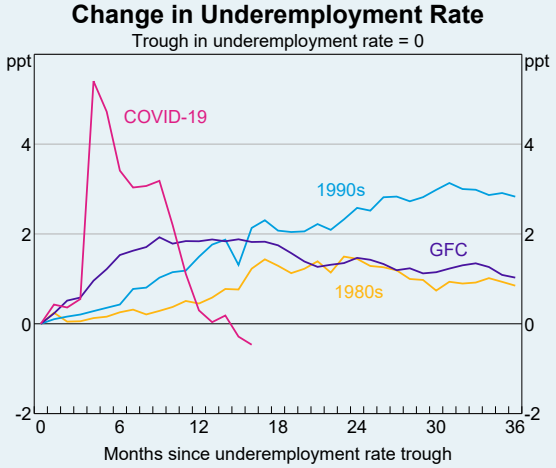


* Working part-time hours
Sources: ABS; RBA

As activity restrictions eased and workplaces reopened, the number of people working reduced hours gradually unwound, and nationally the underemployment rate returned to its pre-pandemic level by December 2020.

The speed of this recovery is highly unusual relative to previous labour market downturns (Graph A3). As discussed elsewhere in this article, over recent decades the underemployment rate has been moving higher, with much of this upwards movement occurring during periods of labour market downturns. In this most recent episode, however, it appears that the unique nature of the labour market downturn – being primarily driven by supply-side restrictions and responses, rather than led by weaker demand – has not resulted in similar lasting effects on the degree of underemployment in the economy.

Graph A3
Change in Underemployment Rate



Sources: ABS; RBA

Appendix A

Table A1: Descriptive Statistics by Labour Force Status

2015–2019 pooled sample average

	Underemployed	Sufficiently Employed	Unemployed	Not in the Labour Force
Share of working age population	6%	56%	4%	35%
Female	58%	46%	47%	59%
Mean age	35 years	37 years	34 years	56 years
Married	43%	57%	34%	52%
Children under 14 in household	34%	36%	35%	22%
Lives in a capital city	65%	70%	67%	64%
Born in Australia	71%	60%	69%	64%
Educational attainment				
Bachelor degree or higher	23%	24%	19%	15%
Year 12 or lower	48%	37%	56%	64%
Part-time status[(a)]	93%	31%	-	-
Casually employed[(b)]	20%	8%	-	-
Owner manager	15%	12%	-	-
Hours worked	16 hours	35 hours	-	-
Preferred hours	32 hours	47 hours	-	-
Job tenure[(c)]	3.5 years	4.7 years	-	-
Multiple job holder	7%	5%	-	-
Expects to leave job[(d)]	18%	11%	-	-
Industry				
Retail trade	19%	10%	-	-
Accommodation & food services	16%	7%	-	-
Healthcare & social assistance	14%	13%	-	-
Occupation				
Community & personal service workers	21%	11%		
Sales workers	19%	9%	-	-
Labourers	19%	10%	-	-

(a) Underemployment is overweight in part-time workers by definition

(b) Has no leave entitlements

(c) Available data of years of job tenure is bottom-coded at 1 year and top-coded at 20 years

(d) Expects not to be working for current employer in 12 months' time

Sources: ABS; RBA

Footnotes

[*] Mark Chambers is from Economic Analysis Department, Blair Chapman completed this work while in Economic Research Department and Eleanor Rogerson completed this work while in Economic Analysis Department. The authors would like to thank James Bishop, Natasha Cassidy, Ewan Rankin and Brendan Russell for thoughtful advice and suggestions in preparing this article.

[1] Wilkins (2007) suggests that the impact on subjective wellbeing for those who are part-time underemployed is not too distant from being unemployed.

[2] The term 'underemployment' is also sometimes used to describe a broader concept of labour underutilisation, including people with experience and qualifications that exceed those required for their current role (in addition to people who are available for extra hours of work). In this article we only consider time-related underemployment.

[3] The headline part-time underemployment series has undergone slight definitional changes, particularly in 2001 and 2003, which means that it is not directly comparable before and after these points.

[4] Yuen and Smith (2019), in a study for the Fair Work Commission, used shift-share analysis to consider a range of age, sex, industry and occupation characteristics, as well as changing shares of full-time and part-time employment. These authors found that compositional changes in the labour market across these other dimensions generally had made only small contributions to the aggregate underemployment rate. Instead, the largest compositional driver was the increased share of part-time employment.

[5] Comparing industry underemployment is more straightforward using underemployment ratios than rates; ratios represent the share of employed people in the industry who are underemployed and exclude non-employed people for whom it can be hard to assign to an industry.

[6] This analysis draws on ABS' Longitudinal Labour Force Survey (LLFS) unit record data that has recently become available, which enables us to calculate the probability an individual transitions from one labour market status to another at a monthly frequency. Transition probabilities over longer periods can be calculated using other data sources, such as the Household Income and Labour Dynamics in Australia survey (HILDA).

[7] Point-to-point transitions over the quarter.

[8] These transition probabilities are based on the period in which survey respondents are included in the ABS' LFS sample. From the point of first being included in a monthly sample, a survey respondent typically participates in the survey for 8 months. Given this, the ABS' LLFS does not have information on the duration for which a respondent has been in their current employment status at the point they entered the survey, or changes subsequent to them exiting the survey.

[9] The measured underemployment rate may also overstate the true extent of spare capacity represented by underemployment since, as with unemployment, some amount of structural and frictional underemployment is likely to be always present in a dynamic labour market. For a simple discussion of different types of unemployment, see Reserve Bank of Australia (2021).

[10] Bishop and Day (2020) estimate the JobKeeper wage subsidy program and JobKeeper-enabled stand-downs kept at least 700,000 people attached to their employers, who might have otherwise lost their jobs.

References

Arsov I and R Evans (2018), 'Wage Growth in Advanced Economies', RBA *Bulletin*, March. Viewed 9 June 2021. Available at <https://www.rba.gov.au/publications/bulletin/2018/mar/wage-growth-in-advanced-economies.html>.

Bell DNF and DG Blanchflower (2021), 'Underemployment in the United States and Europe', *ILR Review*, 74(1), pp 56–94.

Bishop J and I Day (2020), 'How Many Jobs Did JobKeeper Keep?', RBA Research Discussion Paper No 2020-07.

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

Bishop J, L Gustafsson and M Plumb (2016), 'Jobs or Hours? Cyclical Labour Market Adjustment in Australia', RBA Research Discussion Paper No 2016-06.

Chua CL and T Robinson (2018), 'Why Has Australian Wages Growth Been So Low? A Phillips Curve Perspective', *Economic Record*, 94(S1), pp 11–32.

Cusbert T (2017), 'Estimating the NAIRU and the Unemployment Gap', RBA *Bulletin*, June, pp 13–22.

Dhillon Z and N Cassidy (2018), 'Labour Market Outcomes for Younger People', RBA *Bulletin*, June. Viewed 9 June 2021. Available at <https://www.rba.gov.au/publications/bulletin/2018/jun/labour-market-outcomes-for-younger-people.html>.

Heath A (2018), 'The Evolving Australian Labour Market', Business Educators Australasia 2018 Biennial Conference, Canberra, 5 October.

Hong GH, Z Koczan, W Lian and MS Nabar (2018), 'More Slack than Meets the Eye? Recent Wage Dynamics in Advanced Economies', IMF Working Paper 18/50.

Lowe P (2019), 'The Labour Market and Spare Capacity', Address to a Committee for Economic Development of Australia (CEDA) Event, Adelaide, 20 June.

Reserve Bank of Australia (2021), 'Unemployment: Its Measurement and Types', RBA *Explainer*, March. Viewed 9 June 2021. Available at <https://www.rba.gov.au/education/resources/explainers/unemployment-its-measurement-and-types.html>.

Ruberl H, M Ball, L Lucas and T Williamson (2021), 'Estimating the NAIRU in Australia', Treasury Working Paper 2021-01.

Treasury (2017), 'Analysis of wage growth', Treasury Working Paper.

Wilkins R (2007), 'The Consequences of Underemployment for the Underemployed', *Journal of Industrial Relations*, 49(2), pp 247–275.

Yuen K and O Smith (2019), 'Insights into underemployment', Fair Work Commission Research Report 2/2019, February. Viewed 9 June 2021. Available at <https://www.fwc.gov.au/documents/wage-reviews/2018-19/research/underemployment.pdf>.

The Global Fiscal Response to COVID-19

Callum Hudson, Benjamin Watson, Alexandra Baker and Ivailo Arsov[*]

Photo: Kanawa Studio

Abstract

Globally, the fiscal policy response to the COVID-19 crisis has been the largest and fastest in peacetime. Governments have prioritised direct fiscal support for private incomes and employment, which has limited economic scarring and established a solid foundation for the recovery. The size and composition of the fiscal response has varied across countries, reflecting differences in automatic stabilisers, pre-pandemic fiscal space, the severity of infections and policy preferences. Fiscal policy is likely to remain supportive for some time after the pandemic subsides, and in many countries is expected to focus increasingly on boosting investment. For as long as governments anchor spending decisions in a sound medium-term fiscal framework and interest rates remain lower than the rate of economic growth, ongoing fiscal support need not pose problems for government debt sustainability.

The COVID-19 pandemic sharply disrupted economic activity and, in most countries, triggered the largest economic contraction since at least the Second World War. As the severity of the pandemic became apparent early in 2020, authorities across the world began implementing a large and multifaceted policy response. This included the largest fiscal policy response in decades, which substantially limited the decline in economic activity.[1] The subsequent recovery has also been stronger than expected in large part due to unprecedented policy support. This fiscal response can be characterised as having two phases:

1. In the *acute phase*, which is still ongoing in many economies, the response has focused on supporting private incomes, preserving employment relationships and shoring up health systems. This has mainly been achieved through large direct transfers to households, enhanced unemployment benefits, wage subsidies and increased healthcare funding.
2. In the *recovery phase*, when infections have been brought under control, fiscal support will

pivot toward boosting investment. This includes public infrastructure, 'green' investment and, to a lesser extent, incentives to support private investment and consumption. These support measures will be spread over a longer period than the acute phase.

This article focuses on the fiscal response during the acute phase and measures that affect government spending and revenue (i.e. the direct fiscal response), as opposed to indirect (off-budget) measures that do not have an immediate effect on the budget (such as loan guarantees). The first section examines the size and composition of fiscal responses around the world. This is followed by a discussion of its effects on labour markets, private incomes, economic activity and governments' fiscal sustainability. The article concludes with a brief outline of policy measures largely intended for the recovery phase.[2]

The fiscal response to the COVID-19 pandemic was the largest in peacetime

Most economies have yet to move beyond the acute phase of the fiscal response. These direct measures, including those that are expected to persist into early 2022, have ranged from 5 to 24 per cent of 2019 GDP in advanced economies. Authorities in emerging market economies have provided smaller, yet still significant, direct fiscal support which has been equivalent to between 1 and 9 per cent of GDP (IMF 2021). For many economies, this has contributed to the largest single-year increase in the government debt-to-GDP ratio during peacetime (Graph 1).

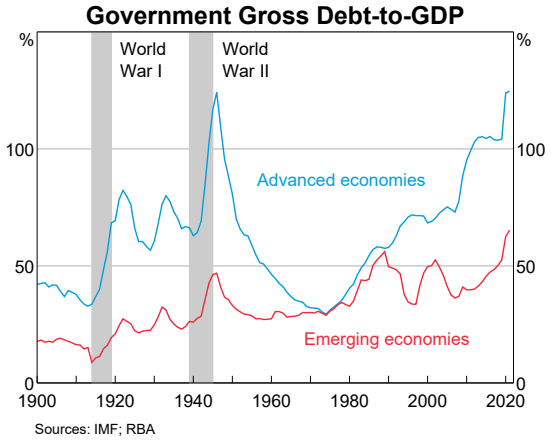
Fiscal support in the acute phase of the downturn was initially delivered rapidly, and in large part was a response to the effects of public health measures (such as mobility restrictions) on economic activity. The first wave of fiscal measures was delivered between February and April 2020 (Graph 2). As the first country to be affected by the COVID-19 outbreak, China was the first to announce significant fiscal support measures (in February). This was followed shortly thereafter by other economies in Asia, and then economies in the rest of the world as the pandemic spread and strict public health measures were imposed. Fiscal measures were expanded and enhanced rapidly throughout April as the severity of the pandemic, and the extent of the economic damage it was causing, became more apparent.

Governments in advanced economies have demonstrated flexibility in their fiscal response. The majority of fiscal measures had been designed to be short lived, often just a few months in duration, but repeated infection outbreaks, and associated public health controls, prompted fiscal authorities to extend measures further than originally envisaged. Many programs are still providing significant support to the economy. In emerging economies, fiscal support was frontloaded in the first half of 2020, but despite significant subsequent resurgences of infections, authorities were (or at least felt) constrained in their ability to continue extending large scale fiscal support.

The size of fiscal support has varied across economies

The size of direct fiscal support has varied across economies because of differences in automatic stabilisers, pre-pandemic fiscal space and decisions by some countries to implement sizeable indirect fiscal measures instead. Automatic stabilisers are government policies that automatically adjust government spending and revenue to support economic activity through different stages of the business cycle. For example, during economic downturns, government outlays naturally increase as more people receive unemployment benefits (which support household incomes and consump-

Graph 1



tion), while at the same time government revenues derived from taxes on household and business incomes and consumption tend to fall, especially where tax rates are progressive, which results in a smaller share of income going into taxes at lower levels of income.

Advanced economies with strong automatic stabilisers, including those with more generous unemployment benefits and pre-funded wage subsidy schemes designed to maintain employment relationships, required smaller additional fiscal measures in order to provide the same support to private incomes as other economies with weaker automatic stabilisers. European economies tend to have strong automatic stabilisers that provide relatively high levels of support to a larger share of their populations, which is one reason why their direct fiscal support has been smaller. In contrast, the United States has weaker automatic stabilisers, and this was one reason why US authorities provided the largest additional direct fiscal support in the first year of the pandemic.

Advanced economies that initially provided large direct fiscal responses also tended to be those with lower pre-pandemic government debt and smaller fiscal deficits. This group included Australia, Germany, New Zealand and Singapore. As the pandemic wore on, other governments became increasingly willing to extend and increase their fiscal support given its effectiveness earlier in the crisis and the low cost of funding this support through government bond issuance.

In emerging market economies, the direct fiscal support measures were, on average, smaller in scale compared to advanced economies. This reflected greater financing constraints experienced by some governments, including the high cost of new bond issuance (Alberola *et al* 2020). These financing constraints have made it more difficult for many emerging market economies to support their health systems and economically vulnerable segments of their populations.

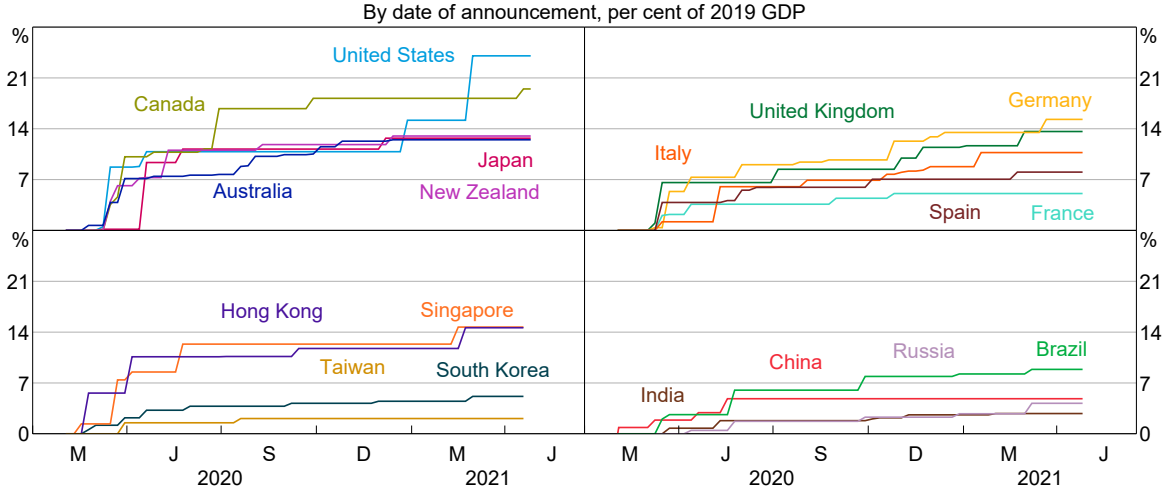
In the case of China, where government debt is relatively low, the early control of domestic infections and strong global demand for goods helped economic activity return quickly to its pre-pandemic trajectory. As a result, Chinese policymakers did not need to provide as much direct fiscal support as other economies, though support from other state-affiliated agents (such as state-owned enterprises and banks) has continued to play an important stabilising role in the economy.

Some governments have attempted to support their economy with a larger emphasis on indirect fiscal measures such as loans and loan guarantees (Graph 3). This has typically reflected policy preferences of the authorities and a more limited

Graph 2

Cumulative Acute Phase Direct Fiscal Response*

By date of announcement, per cent of 2019 GDP



* Includes fiscal measures announced by April 2021 and state government stimulus for Australia, Canada, Germany. Excludes loan guarantees and unallocated funds. China is based on announced changes in budget deficit for all levels of government, excludes state-owned enterprises; all other countries are based on announcements from national sources

Sources: IMF; national sources; RBA; Refinitiv

ability to increase direct fiscal spending. Indirect fiscal measures were used extensively in the European Union because of concerns early in the pandemic about the ability of some member countries to raise funds at favourable interest rates and in a manner compliant with their EU treaty obligations.[3] Indirect fiscal measures comprised a large proportion of the fiscal response in some emerging market economies, including India and Brazil, due to their more limited fiscal space. These indirect fiscal measures were still much smaller than in advanced economies.

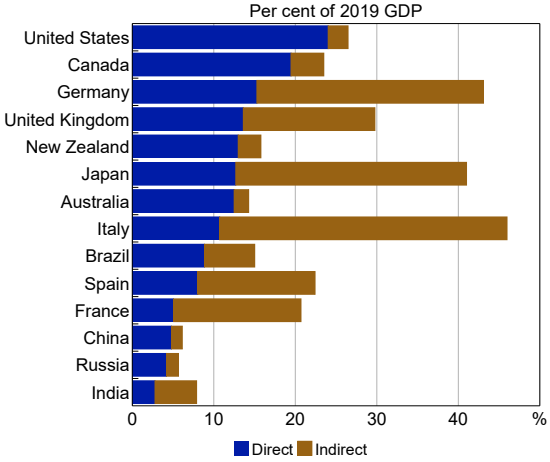
Governments prioritised support for private incomes, employment and the health response

Without decisive policy interventions, the pandemic would have sharply reduced household and business incomes, caused greater labour market disruption and prolonged economic scarring through business and personal bankruptcies and higher long-term unemployment. Indeed, in the early days of the pandemic, there were widespread concerns that it may lead to another Great Depression (Gumede 2020). Fiscal policy was swiftly recognised as the best tool to address these risks because it could be targeted at directly supporting incomes on a large scale (Baldwin and Weder di Mauro 2020).

Graph 3

Acute Phase Direct and Indirect Fiscal Support*

Per cent of 2019 GDP



* Includes fiscal measures announced by April 2021. China is based on announced changes in budget deficit

Sources: IMF; national sources; RBA; Refinitiv

The direct fiscal response in the acute phase has mainly consisted of direct transfers to households and businesses, wage subsidies and tax deferrals (Graph 4). Private sector cash flows were also supported by measures such as low cost (often government-guaranteed) loans and the temporary pausing of some debt and other contractual obligations, such as rent and mortgage payments. Most of the acute phase direct fiscal support has been disbursed in 2020 and early 2021.

As part of this support, wage subsidy schemes were deployed in almost all advanced economies to preserve pre-pandemic employment relationships and to provide replacement income to workers in affected businesses. The use of wage subsidies was motivated by a range of considerations: expectations that the pandemic disruptions would be short lived; the limited need for structural adjustment given the nature of the shock; and the perceived success of Germany's wage subsidy scheme during the Global Financial Crisis.[4] In the United States, the *Paycheck Protection Program* served a similar function through government-guaranteed loans that were forgiven when they were used to support employment and wages.

The take-up of wage subsidies has been substantial. Across advanced economies, the use of the subsidies peaked at between 15 to 60 per cent of the labour force. These peaks were generally reached in early 2020 when containment measures were most stringent and thus when activity was weakest. The value of wage subsidy programs has been difficult to compare across economies as some governments utilised existing schemes that were already funded (partly or in full) from past contributions.

Another key component of fiscal support during the acute phase has comprised unemployment benefits, which in some economies have been increased, extended and made easier to access. These changes were most consequential in the United States, where benefits were substantially increased as unemployment increased sharply; the income of many unemployment benefit recipients in the United States was higher than their earnings in the jobs they had before the pandemic (Ganong, Noel and Vavra 2020). Unemployment benefits were

also increased in Australia but to a lesser degree. Meanwhile, Canada implemented a new and temporary unemployment benefit scheme, to better deal with the impact of the pandemic on incomes.

A few advanced economies also provided substantial direct transfers to households in the form of cash payments. These payments were largest in the United States, totalling 6 per cent of GDP or 11 per cent of median household income. Hong Kong, Japan and Singapore also made large direct transfers to households.

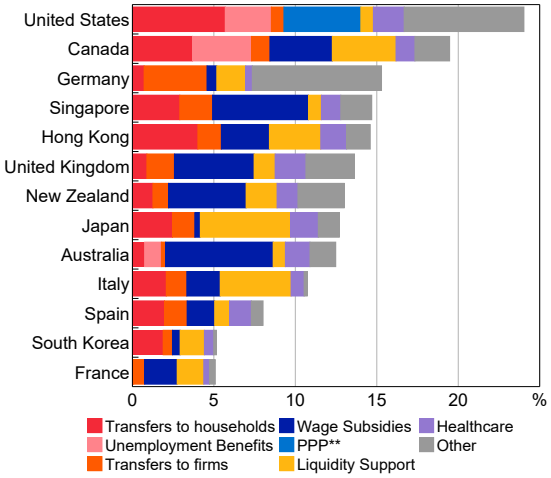
As a result of these fiscal policy measures, private incomes in advanced economies held up well during the pandemic despite the sharp drop in economic activity and hours worked (Graph 5). This outcome is in stark contrast to the experience during previous recessions when private incomes typically fell. In some economies, including Australia, Canada and the United States, household incomes increased sharply. In most European economies and Japan, wage subsidies only partially replaced wages, so household incomes declined. In addition to boosting household incomes, wage subsidies supported business viability by helping firms meet their major expense, labour costs; this helped reduce bankruptcies.

Household income support schemes helped to cushion the fall in household consumption. By providing households with more income certainty, they supported households in maintaining a higher level of consumption than otherwise; restrictions on services consumption meant that this boost to consumption was most evident in spending on goods. These schemes also contributed to a significant increase in household savings during 2020 and early 2021.

Graph 4

Type of Acute Phase Direct Fiscal Support*

Per cent of 2019 GDP



* Includes fiscal measures announced by April 2021 and state government stimulus for Australia, Canada, Germany. Excludes loan guarantees and unallocated funds

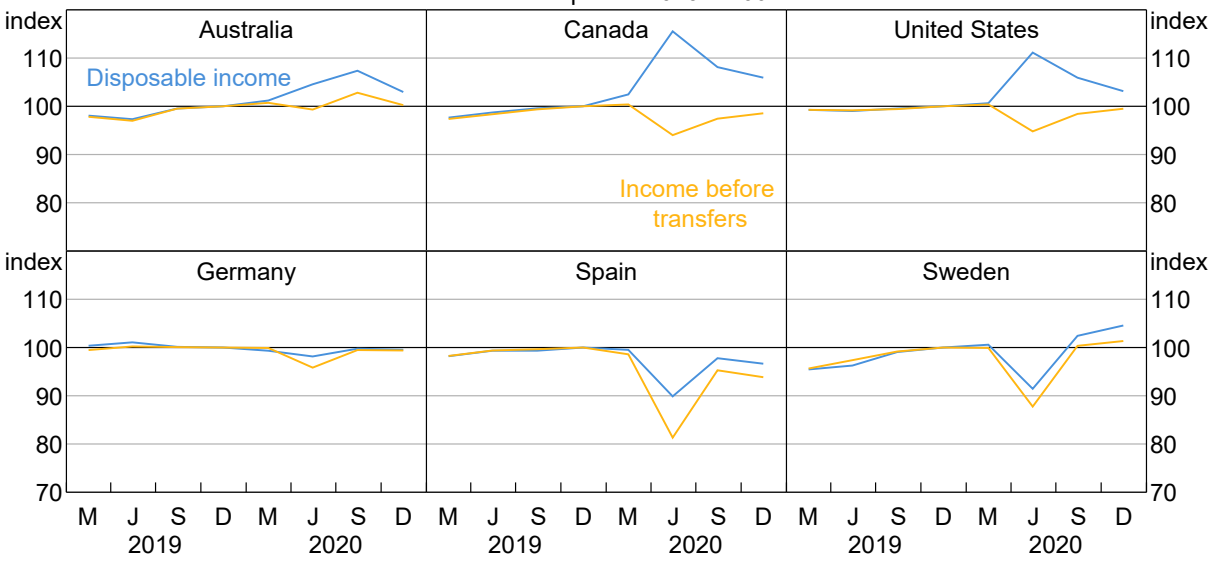
** Paycheck Protection Program

Sources: IMF; national sources; RBA; Refinitiv

Graph 5

Real Household Income

December quarter 2019 = 100



Sources: National sources; OECD; RBA; Refinitiv

Economic scarring effects, which can be caused by extended periods of unemployment (resulting in discouraged workers), firm closures and weak investment, have been smaller than was feared in the early stages of the pandemic. They have also been smaller than observed following past recessions, as unemployment rate forecasts made early in the pandemic have turned out to be too pessimistic in most advanced economies (Graph 6).[5] This was in part due to the substantial and growing fiscal and monetary support that limited the effect of the pandemic on the level of unemployment (IMF 2021). Participation rates and hours worked declined sharply early in the pandemic, but started to recover later in 2020 and, in some economies such as Australia, have recently returned to pre-pandemic levels. In supporting firms' balance sheets and employment, the fiscal response in many economies has helped to provide a foundation for strengthening labour market conditions.

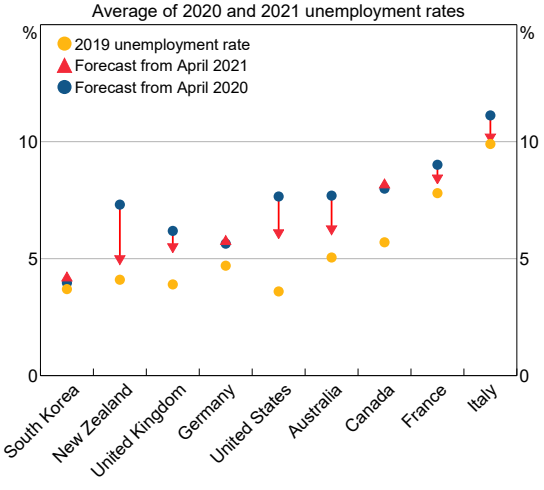
In some of the large emerging market economies, including Brazil, India and Russia, the direct fiscal response prioritised income support for the most vulnerable parts of their populations through direct transfers and subsidies for essential consumption; these measures were smaller than in advanced economies. By contrast, China's support measures were mostly targeted to small businesses and stimulating aggregate demand directly, including through infrastructure investment. The Chinese Government also encouraged state-owned enterprises and banks to support employment and financing conditions, as is often the case in global and regional downturns.

All economies provided additional funding for their healthcare systems to increase hospital resources, COVID-19 testing and contact tracing. Governments have also expanded funding since late 2020 in support of the procurement and rollout of vaccine programs. Although the additional healthcare spending has been a small share of the direct fiscal support, it has led to a 20 per cent increase in healthcare spending in advanced economies.

Graph 6

Unemployment Rate Forecasts

Average of 2020 and 2021 unemployment rates



Sources: Consensus Economics; RBA; Refinitiv

Low interest rates have supported fiscal sustainability

The significant global fiscal policy response has been funded largely by debt issuance, with government debt-to-GDP ratios increasing to historically elevated levels in many economies. In advanced economies, the higher government debt levels have not called into question the sustainability of government finances. This partly reflects low interest rates on government debt. The prevailing combination of low long-term interest rates that are lower than expected economic growth means that many governments can stabilise their debt-to-GDP ratios even while running primary fiscal deficits (i.e. fiscal deficits before the payment of interest on their debt).

Broadly speaking, government debt is considered sustainable when governments can continue to service their debt (and avoid default or debasing the currency) without having to significantly adjust fiscal policy settings, including by cutting spending or raising taxes which risks slowing the economy. The sustainability of debt is important for a couple of reasons. One is that it allows governments to pursue their public policy priorities without being forced to undertake significant unwanted fiscal adjustments. Another major reason is that governments with less sustainable debt may be limited in their ability to respond to future negative economic shocks by providing debt-funded fiscal stimulus.

In some economies, low levels of public debt has meant that fiscal deficits have been comfortably

financed in the capital markets. The ability of governments to run a primary fiscal deficit without endangering debt sustainability also partly depends on the difference between the interest on the government's debt and the growth in GDP (the interest rate-growth differential; Furman and Summers 2020). If the interest rate on government debt is lower than the growth rate of the economy, then growth in the economy will lower government debt as a share of GDP as long as the primary deficit is not too big.

In advanced economies, the interest rate-growth differential has been negative since the early 2000s and has declined further during the pandemic, as interest rates on government debt have declined by more than expected longer-term GDP growth rates (Graph 7). As of April 2021, the International Monetary Fund (IMF) (IMF 2021) expects that in the years immediately after the pandemic, advanced economies with elevated government debt levels will have primary deficits that are small enough to stabilise or reduce their debt-to-GDP ratios (Graph 8). The IMF expects that some advanced economies with lower levels of government debt may take longer to reduce their debt-to-GDP ratios as they will be under less pressure from the financial markets to do so.

While the interest rate-growth differential has not been volatile over the past 30 years, it can rise rapidly if there is a sudden reassessment of a government's fiscal sustainability (Mauro and Zhou 2020). Therefore, were the currently supportive conditions to change, some governments may face difficulties stabilising debt-to-GDP ratios without a significant change in their fiscal settings.

Further fiscal support will contribute to a more complete recovery

Fiscal policy in advanced economies is expected to remain accommodative over the next few years as the support during the acute phase evolves into fiscal support for the recovery phase. This transition will necessarily involve a different set of longer-term priorities. Countries will make this transition at different times.

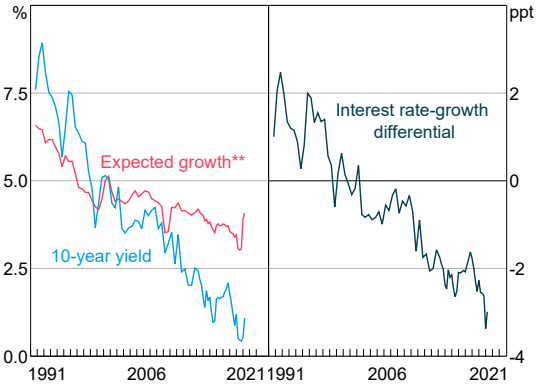
In most advanced economies, where economic activity remains constrained by containment measures, fiscal policy is expected to continue to focus on supporting incomes and preserving employment relationships for some time. But as infections are brought under control and vaccines are rolled out, the emphasis of fiscal support will shift. This will entail a greater focus on public investment, particularly in green and digital initiatives, incentives for more consumption and private investment, and retraining programs for workers in those sectors that are expected to have been severely impacted during the pandemic.

The fiscal measures that have already been announced for the recovery phase are substantial

Graph 7

Interest Rate-Growth Differential

Select advanced economies*



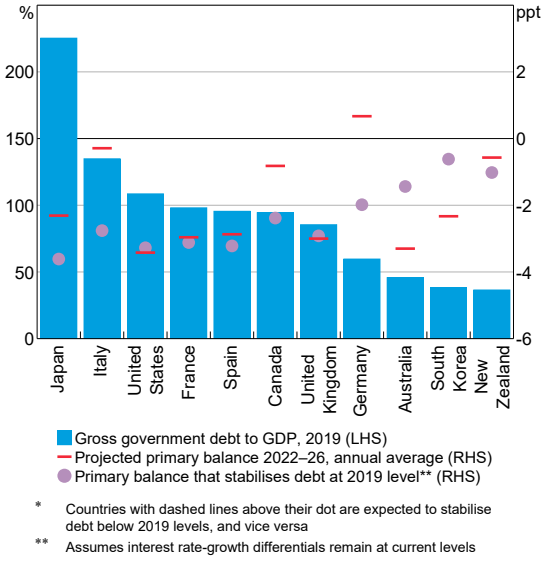
* PPP GDP-weighted average of Australia, Canada, France, Germany, Italy, Japan, New Zealand, South Korea, Spain, United Kingdom and United States

** Expected average annual nominal GDP growth over following 10-years

Sources: Bloomberg; Consensus Economics; IMF; RBA

Graph 8

Fiscal Indicators*



* Countries with dashed lines above their dot are expected to stabilise debt below 2019 levels, and vice versa

** Assumes interest rate-growth differentials remain at current levels

Sources: Consensus Economics; IMF; OECD; RBA

but in most economies are smaller than for the acute phase and will be spread over a longer period. With significant spare capacity in most advanced economies, these measures can reduce the long-term economic 'scarring effects' of the pandemic without generating high inflation. The size and design of the recovery phase fiscal support varies across countries (Graph 9). The United States is expected to provide very large recovery phase fiscal support, equivalent to 9 per cent of GDP, which will be focused on infrastructure investment and spread over a decade. European Union members will deploy a combination of grants and loans that are expected to be spent between 2021 and 2026. These measures will be funded by EU-issued debt that will provide recovery fiscal support equal to 5 per cent of EU GDP.[6] The distribution of these funds will be tilted to EU members more heavily affected by the pandemic and those who began the pandemic with weaker economic fundamentals. In a few other smaller economies, fiscal support for the recovery phase will likely be as large as 6 per cent of pre-pandemic GDP.

The announced recovery phase measures should help avoid a repeat of the post-Global Financial Crisis experience in some advanced economies, where fiscal austerity was adopted before the economic recovery was entrenched. The premature winding back of fiscal support, before private demand was able to sustain the recovery, created unnecessary headwinds for many economies (House, Proebsting and Tesar 2017).

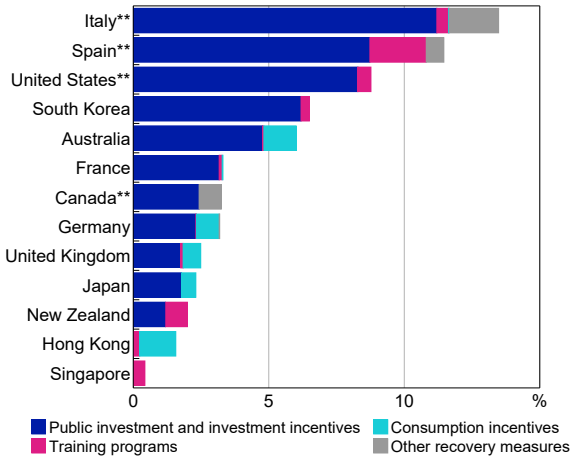
Fiscal support during the acute phase of the pandemic has been so large that, even with the transition to the sizeable recovery phase support, there will be a tightening of fiscal settings in 2022. In advanced economies, cyclically adjusted fiscal deficits, which represent the deficit after accounting for the role of automatic stabilisers, are expected to decline from 2022; this will result in what is known as 'fiscal drag' (Graph 10). The projected decline in deficits largely reflects expectations that reduced fiscal support, such as wage subsidies or unemployment benefits, will be needed as economic activity normalises. On current expectations the reduction in the direct fiscal support will occur when the economic recovery is more progressed than it was during the Global Financial Crisis and it should be less disruptive to the recovery from the COVID-19 pandemic.

In emerging markets, where fiscal space is often more limited, some governments with pre-existing macroeconomic or financial imbalances have faced more pressure to reduce fiscal deficits. But this experience has varied considerably across countries. Some large emerging market economies in Asia have had few issues in announcing fiscal measures to support activity during their recovery phase. For instance, India announced fiscal stimulus measures after the initial lockdown ended in October 2020, including consumption incentives and increased infrastructure spending, while China started transitioning to its recovery phase measures in the middle of 2020. But most emerging economies are yet to announce substantial support for the recovery phase, partly because their priority is still on bolstering health systems to deal with elevated infections and to support the rollout of vaccination programs.

Graph 9

Recovery Phase Direct Fiscal Support*

Per cent of 2019 GDP



* Fiscal measures aimed for the recovery phase, i.e. after the pandemic has passed; includes fiscal measures announced by April 2021 and state governments for Australia, Canada and Germany; includes EU Recovery and Resilience Facility funds for EU countries where spending plans are available; expected to be spent over multiple years

** Proposed support not yet approved

Sources: IMF; national sources; RBA; Refinitiv

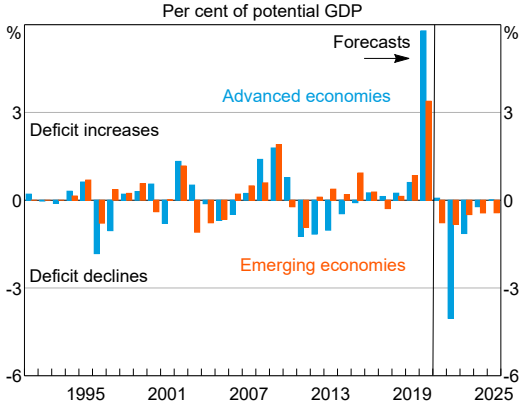
Conclusion

The COVID-19 pandemic caused the largest fall in economic activity since at least the Second World War. Along with substantial monetary policy easing,

Graph 10

Change in Cyclically Adjusted Primary Deficits

Per cent of potential GDP



Sources: RBA; Refinitiv

this has been met with a significant fiscal policy response in most economies. Governments have prioritised direct fiscal support for private incomes and employment, which has limited economic scarring and given the recovery a solid basis. Fortunately, a repeat of the premature shift to fiscal austerity as seen in a number of economies after the Global Financial Crisis appears unlikely, with fiscal settings likely to evolve but remain supportive for some time after the pandemic subsides.

Footnotes

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[1] Significant fiscal responses were estimated to limited the peak-to-trough decline in activity in advanced economies to 11½ per cent, some 5 percentage points lower than otherwise (Chudik, Mohaddes and Raissi 2021)

[2] The article discusses fiscal support announced by April 2021. While policies and the context in which they are implemented differ across economies, best efforts have been made to draw high-level comparisons to illustrate key commonalities and differences.

[3] These constraints were eased with the European Commission temporarily relaxing the EU's fiscal rules in March 2020 (European Commission 2020) and the ECB acting forcefully to reduce differences in government funding rates across the euro area (European Central Bank 2021).

[4] For a discussion of Germany's experience with wage subsidies schemes during the Global Financial Crisis, see (Cooper, Meyer and Schott 2017).

[5] For further detail on the economic effects of fiscal policy during the COVID-19 crisis, see (IMF 2021)

[6] The funding is from the Next Generation EU Recovery and Resilience Facility. The grants effectively allow for increased fiscal transfers within the EU to its members that are less developed and that entered the crisis in worse economic positions. The lending is designed to subsidise borrowing costs for the EU's member economies with more elevated government debt levels and sovereign bond yields. For further details see (RBA 2020).

References

Alberola E, Y Arslan, G Cheng and R Moessner (2020), 'The Fiscal Response to the COVID-19 Crisis in Advanced and Emerging Market Economies', BIS Bulletin No 23.

Auerbach A and Y Gorodnichenko (2017), 'Fiscal Stimulus and Fiscal Sustainability', NBER Working Paper 23789.

Baldwin R and B Weder di Mauro (2020), *Economics in the time of COVID-19*.

Blanchard O (2019), 'Public Debt and Low Interest Rates', *American Economic Review*, 109(4), pp 1197–1229.

Chudik A, K Mohaddes and M Raissi (2021), 'COVID-19 Fiscal Support and its Effectiveness', Centre for Applied Macroeconomic Analysis Working Paper 28/2021.

Cooper R, M Meyer and I Schott (2017), 'The Employment and Output Effects of Short-time Work in Germany', NBER Working Paper 23688.

DeLong B and L Summers (2012), 'Fiscal Policy in a Depressed Economy', *Brookings Papers on Economic Activity*, Spring, pp 233–297.

European Central Bank (2021), 'Pandemic Emergency Purchase Programe (PEPP)', 16 April. Available at <https://www.ecb.europa.eu/mopo/implement/pepp/html/index.en.html>.

European Commission (2020), 'Communication From the Commission to the Council on the Activation of the General Escape Clause of the Stability and Growth Pact', Media Release No 123 final, 20 March. Available at <https://ec.europa.eu/info/sites/info/files/economy-finance/2_en_act_part1_v3-adopted_text.pdf>.

Furman J and L Summers (2020), 'A Reconsideration of Fiscal Policy in the Era of Low Interest Rates', Peterson Institute for International Economics, Discussion paper, Harvard Kennedy School, December, unpublished manuscript. Available at <https://www.piie.com/system/files/documents/furman-summers2020-12-01paper.pdf>.

Ganong P, P Noel and J Vavra (2020), 'US Unemployment Insurance Replacement Rates During the Pandemic', NBER Working Paper 27216.

Gumede W (2020), 'The Impact of the Coronavirus Could Compare to the Great Depression', *Aljazeera*, 3 May. Available at <https://www.aljazeera.com/opinions/2020/5/3/the-impact-of-coronavirus-could-compare-to-the-great-depression>.

House CL, C Proebsting and LL Tesar (2017), 'Austerity in the Aftermath of the Great Recession', NBER Working Paper 23147.

IMF (2020), 'Fiscal Monitor: Policies for the Recovery', October. Available at <https://www.imf.org/en/Publications/FM/Issues/2020/09/30/october-2020-fiscal-monitor>.

IMF (2021), 'Fiscal Monitor: A Fair Shot', April. Available at <https://www.imf.org/en/Publications/FM/Issues/2021/03/29/fiscal-monitor-april-2021>.

Mauro P and J Zhou (2020), 'r-g less than 0: Can We Sleep More Soundly?', IMF Working Paper 52.

RBA (2020), 'Box B: Fiscal Policy Support for the Recovery Phase in Advanced Economies', RBA *Statement of Monetary Policy*, August.

Examining the Causes of Historical Failures of Central Counterparties

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Photo: Prime Images

Abstract

Although historically rare, the failure of a central counterparty (CCP) could severely disrupt and destabilise the financial system. This has driven a global push to implement resolution regimes so that authorities can support the continuity of critical functions of a distressed CCP. This article examines 3 CCP failures to identify common causes of failure that could help authorities prevent or prepare for a resolution. It finds that while there are some common causes of failure in the episodes considered, they have largely been addressed by improvements in CCP financial risk management in recent years.

Introduction

Central counterparties (CCPs) have played an important role in financial markets for many years and their importance continues to increase with clearing activity experiencing significant growth over the last decade. The main role of CCPs is managing risk, a role which they are widely regarded to have performed well during the global financial crisis (GFC). Following the GFC, an international consensus emerged for the greater use of centralised infrastructure like CCPs, trading platforms and trade repositories in over-the-counter (OTC) derivatives markets to help address some of the concerns of regulators and market participants. Accordingly, in 2009 G20 Leaders committed to mandate centralised clearing of standardised OTC derivatives, resulting in a much greater role for CCPs. This was accompanied by a global uplift in supervisory requirements, including through implementing the Principles for Financial Market Infrastructures (PFMIs).

In the CCP context, a resolution regime gives a resolution authority (usually a central bank) powers to intervene when a CCP becomes distressed to ensure that it maintains its critical functions and thus supports financial stability. The Council of

Financial Regulators has proposed that Australia introduce a resolution regime for clearing and settlement facilities, with the Reserve Bank as the resolution authority (Council of Financial Regulators 2019). The Australian Government announced it will introduce a resolution regime for clearing and settlement facilities as part of the 2021 Budget. One challenge for CCP resolution authorities is that historically CCP failures have been rare. This makes it difficult to predict the circumstances likely to lead to CCP failure that will require resolution. Understanding those circumstances is particularly important for resolution of CCPs, because a CCP failure could be a 'fast burn' event, requiring the resolution authority to make decisions quickly and with incomplete information.

This article examines the causes of historical CCP failures, in order to understand what might precipitate CCP stress in the future. The paper focuses on 3 cases: the Caisse de Liquidation des Affaires en Marchandises in France in 1974, the Kuala Lumpur Commodities Clearing House in 1984 and the Hong Kong Futures Exchange in 1987. While there have been other events that have stressed CCPs, with varying causes and degrees of severity (Cox, Murphy and Budding 2012), these 3 episodes have in common that they led to a CCP being closed for a period of time as well as significant consequences for the affected market.

After identifying the common factors underlying the 3 failures, this article examines how these factors are relevant to understanding potential causes of future CCP failure, considering the changes in financial risk management and supervision of CCPs that have taken place since the failures occurred.

Caisse de Liquidation des Affaires en Marchandises (1974)

Background

Caisse de Liquidation des Affaires en Marchandises (CLAM) was a CCP servicing the Paris Commodity Exchange, a market which traded cocoa, coffee and sugar futures (Bignon and Vuillemey 2017).

Between November 1973 and November 1974 there was a sixfold increase in global sugar prices. There was also a significant increase in speculation on sugar at the Paris Commodity Exchange, with transactions registered by CLAM increasing from 54,000 tons per month in 1971 to 1.9 million tons per month in 1974.

CLAM's risk management framework primarily consisted of collecting initial margin and variation margin, which were calculated daily. Initial margin was calculated at about 10 per cent of the value of the contract. The market had a daily 'limit down price', meaning the market would close for the day if prices fell by more than a certain amount. The purpose of a limit down price is to reduce volatility from temporary market panics.

Typically, each client would have a margin account with their participant, in which they were required to deposit initial margin plus a buffer of around 5 per cent of the value of contracts. Many participants had clients that predominantly had either long or short positions, meaning those participants were highly exposed to directional movements in prices.

CLAM had no default fund or tools to allocate default losses to participants. By implication, any losses beyond the participant's margin would be absorbed by the CCP's equity.

Default

In mid November 1974 global sugar prices began to collapse. Between 21 November and 2 December the daily limit down price was hit 7 times, with prices falling 21 per cent. This caused severe problems for several participants, including Nataf, which was the largest participant at CLAM. Over the course of 1974, clients of Nataf had increased their long exposures as global sugar prices rapidly increased. Nataf went from holding just 9 per cent of all open positions in January 1974 to 56 per cent by November, held on behalf of around 600 retail traders.

By 25 November, Nataf was technically in default, having failed to meet margin requirements. However, CLAM did not immediately call Nataf into default, allowing it to continue to register trades. By the time Nataf was called into default on 2 December, all of Nataf's initial margin had been

Box A: How do CCPs operate?

CCPs are a type of financial institution that help facilitate efficient trading in some financial products. They *clear* trades by acting as an intermediary between buyer and seller, assuming the role of buyer to every seller and seller to every buyer, guaranteeing performance of obligations. Some CCPs also *settle* trades, which is the process of finalising trades by delivering cash to the seller and assets and/or cash to the buyer. These clearing and settlement functions allow financial markets to operate smoothly and efficiently. Financial institutions that are authorised to trade directly through CCPs are called *participants*. Participants make trades on behalf of themselves or their clients (the latter is known as *client clearing*). In client clearing, if a client fails to meet its obligations the participant is responsible for those obligations. It is only when a participant fails that the CCP takes on responsibility.

A key role of CCPs is to manage counterparty credit risk (the risk that a counterparty does not fully meet its financial obligations). One way they manage this risk is by collecting margin. There are two main types of margin collected.*Initial margin* is collected on open positions at the time the transaction is made. Its size is calibrated by the CCP to cover significant price movements and is held by the CCP as collateral. *Variation margin* is collected periodically (often daily) based on price movements and is passed via the CCP from the participant whose position has lost value to the participant whose position has gained value. CCPs also maintain a prefunded buffer of pooled financial resources to cover additional losses (known as a *default fund)* that could arise if a participant were to default in stressed market conditions and its initial margin and other contributions were insufficient to cover the losses. This can include participant and CCP contributions.

A CCP may be exposed to losses if a participant fails to meet their obligation to pay margin. The CCP will then no longer have a *matched book* in that they no longer have a participant on each side of each trade, and is now exposed to market risk. CCPs will attempt to return to a matched book by closing out or auctioning the defaulter's portfolio to remaining participants. Depending on the price at which the CCP is able to dispose of the defaulter's portfolio, it may incur losses. These would be covered, in the first instance, from the initial margin provided by the defaulter. If this was not sufficient, the CCP may need to draw on its default fund.

Many CCPs also have the power to allocate default losses to participants where they do not have the resources to absorb them, or even to tear up contracts as a last resort if they are unable to liquidate the defaulting participant's portfolio.

A CCP could fail for a number of reasons, including that it runs out of financial resources to meet its obligations and is forced to cease provision of services, or that its actions substantially undermine confidence in the market it clears for. The failure of a systemically important CCP could significantly undermine the stability of the markets in which it operates or even the global financial system.

exhausted and approximately 50 per cent of Nataf's clients were in default.

With sugar prices down 21 per cent, another limit down price movement would result in 2 more participants defaulting, with the potential for 8 to 10 participants to default if the price continued to fall. On this basis, the French Minister of Commerce authorised the temporary closure of the market at CLAM's request.

CLAM then attempted to close out open positions at a settlement price that would minimise its losses. A clause in CLAM's rulebook provided that if trading is suspended due to exceptional circumstances the technical committee of CLAM sets a price for the immediate settlement of outstanding positions

equal to the average price in the last 20 trading days. This would have been well above the closing price on 2 December, and at that price Nataf would not have been in default (meaning the CCP would bear no losses).

Clients with short positions disputed the claim that a collapse in the price of a commodity constituted exceptional circumstances. They pushed for an arrangement with CLAM to allow the market to reopen, offering to buy Nataf's defaulted position at a price of sugar when the market was closed on 2 December. This offer would have enabled CLAM to continue operating after absorbing losses of less than a third of its equity. However CLAM refused, even as global sugar prices continued to fall further.

In June 1975, a French court declared the decision to close the market was unlawful. This ended any hopes of CLAM reopening, and the French Government appointed an administrator to the CCP.

Kuala Lumpur Commodities Clearing House (1984)

Background

Established in 1980, the Kuala Lumpur Commodities Exchange (KLCE) was a futures market for palm oil, rubber, tin and other commodities with trades cleared by the Kuala Lumpur Commodities Clearing House (KLCCH). It was the world's only commodity exchange for palm oil futures, with Malaysia being the world's largest exporter of palm oil. The KLCE experienced strong growth in its first years of operating, with trading volumes growing over 150 per cent between 1982 and 1983 on one-month forward contracts (Asian Wall Street Journal 1984).

Over the second half of 1983 palm oil prices began to rise steeply due to lower production of palm oil in Malaysia, lower production of soybean in the United States and strong global demand. Between 1 July 1983 and mid January 1984 palm oil prices grew by 275 percent (Financial Times 1984), with particularly strong growth in early January.

Participants at KLCCH conducted client clearing, and were subject to membership requirements including minimum paid-up capital and net asset requirements. Participants were also required to make a contribution with the KLCCH as a deposit to cover their own exposure, but there were no mutualised default resources. From the available sources, specifics on how the margin framework at the KLCCH worked are unclear (Financial Times 1984).

The KLCE and KLCCH were regulated by the Malaysian Commissioner of Commodities Trading and run by a 12 person Exchange Management Board. Under the KLCE's rules, it had various emergency powers, including powers to limit trading.

Default

The default was primarily caused by one trader, Loo Cheng Ghee. Mr Loo began trading palm oil in early January 1984. He sold contracts through a participant, Sakapp Commodities (Sakapp).

Mr Loo built up a large short position through January and February 1984, leading the KLCCH to ask Sakapp to restrict its trading on 22 February. Mr Loo responded by spreading his trading among 5 other participants. At the beginning of March, Mr Loo held a large number of short positions maturing that month, requiring him to buy offsetting long positions since he could not deliver the physical palm oil. This caused the price to rise further. On 12 March, the KLCE responded by activating emergency regulations to limit trading. On 13 March and 14 March, the 6 participants clearing for Mr Loo defaulted.

Following the defaults, trading was suspended for a week. When the market reopened, palm oil prices had fallen more than 50 per cent. While the market continued to operate, volumes were down by over 95 per cent a year later relative to pre-suspension levels, reflecting a loss of confidence in the CCP and the futures market more broadly due to the incident. The Malaysian Government established a task force to investigate the incident, which published a report (Asian Wall Street Journal 1984).

Hong Kong Futures Exchange (1987)

Background

The Hong Kong Futures Exchange (HKFE) began trading Hong Kong stock market index (Hang Seng Index or HSI) futures in 1986, operating separately from the Stock Exchange of Hong Kong (SEHK). The HKFE quickly experienced sharp growth, with daily trading volumes in HSI futures rising by over 1,800 per cent between May 1986 and September 1987. The HSI rose 55 per cent between 1 January 1987 and 1 October 1987.

Key aspects of financial risk management, including initial margin setting at HKFE, were undertaken by the International Commodities Clearing House Ltd (ICCH), a separate entity from the HKFE (Davison 1988). Trades at HKFE were guaranteed by a further separate entity operated by ICCH, the Future Guarantees Corporation (FGC), which did not have mutualised default resources.

Hong Kong had 2 market regulators: the Securities Commission and the Commodities Trading Commission (Cox 2015).

Default

One trader, Robert Ng, along with a handful of business associates, amassed a long position in HSI futures that constituted over 50 per cent of open long positions. They made these trades through a small number of participants, which in turn led to 3 participants holding 50 per cent of long positions. The long side of the market also had a large number of small and unsophisticated retail speculators, who in many cases were financed by their participants to post margins, giving participants even greater exposure to losses incurred by their clients.

The short side of the market was dominated by arbitrageurs, who were taking advantage of a large premium in the pricing structure of HSI futures contracts over their normal pricing (cash equities price, plus cost of interest, less the dividend rate) by buying stock and selling futures contracts. Around 80 per cent of short positions were held by just 4 participants.

On Monday 19 October 1987 the HSI fell by around 11 per cent, one of the first events in a global equity market crash. This exceeded coverage of initial margin, which was set at roughly 8 per cent of the HSI futures contract value. In anticipation of further falls, the HKFE substantially increased initial margin requirements through an intraday margin call. The large intraday margin call led to some defaults, however over 96% of the intraday margin was collected.

That same day in the United States, following the close in Hong Kong, the Dow Jones Industrial Average fell 22.6 per cent (an event known as Black Monday). In response both the SEHK and the HKFE closed for the rest of the week. However the closures could not prevent large defaults occurring on contracts from the previous day's margin calls – nearly 30 per cent of margin owed to the CCP was not paid, an amount exceeding the total financial resources of the FGC. More defaults were expected when markets reopened.

In response to the situation, various parties including the Hong Kong Government, shareholders of the FGC and participants at the HKFE agreed to fund a HK$2 billion bailout package of the FGC, intended to enable it to meet its obligation to guarantee trades.

When the markets reopened on 26 October, the HSI closed down 33 per cent and the HSI futures closed down 44 per cent. This resulted in 45 participants defaulting, as clients (including Mr Ng) failed to pay margin. Eventually some participants met margin payments on a delayed basis, but the positions of 34 participants were liquidated by the HKFE between 27 October and 2 November. This used the HK$2 billion bailout package, however it enabled the HKFE to recommence operations.

Key causes of failure

In all cases, the key precipitating factor in the lead-up to the failure was a rapid unwinding of a large increase in the price of a futures product (sugar futures, palm oil futures and equities index futures respectively). Without a large price movement, participants are unlikely to default, and even if they do a CCP should be able to liquidate defaulting participants' portfolios and return to a matched

book without incurring significant losses if the market is sufficiently liquid.

However, a large price movement is not usually sufficient to cause a CCP failure. Other CCPs have faced similar-sized price cycles without failing; for example the other CCPs clearing sugar futures did not fail in 1974, and no other CCPs failed during the 1987 global stock market crash (Bernanke 1990). In each of the cases examined above, there were other actions or elements of risk management frameworks that contributed to the failure. These are examined below.

1. Nature of participants and clients

A common factor in the failures considered was the nature of the participants and the clients they serviced. Where one, or a group of participants or clients had very large directional positions, a major price movement was more likely to threaten the CCP. In the case of the KLCCH, a single individual's short position in palm oil futures ultimately led to the failure of the CCP.

The lack of financial sophistication among clients was also a contributing factor in these failures. At CLAM, most of the clients were small retail traders. Many clients were taking on risks they did not understand and they were not prepared for large margin calls when the price corrected rapidly. Some clients did not have enough liquid financial resources while others did not know they could be called for margin at all. Many clients stopped paying margin after sending sell orders to exit their positions, even though these orders were not executed due to limit down trading halts (Bignon and Vuillemey 2017).

The HKFE faced issues arising from its pool of clients. On the long side, there was very high concentration through one large client whose default caused very large losses. It also experienced problems associated with clients taking on excessive risk, sometimes with the assistance of participants. On the short side, the practice of arbitraging the premium between HSI futures and the equities market by shorting futures contracts meant that tearing up the futures contracts at a higher than market value would cause significant losses to the arbitraging short sellers. This would force them to sell stocks to unwind their arbitrage, which would further drive down the HSI and threaten the stability of the financial system. This made tear-up an unviable strategy once the HKFE was closed and contributed to the need for a bail out.

2. Perverse incentives for CCPs that do not align with responsible financial risk management

The episodes considered highlight some perverse incentives for CCPs that may cause them to depart from responsible financial risk management.

The first arises where the interests of the CCP's managers are not aligned with those of the shareholders. For example, at KLCCH it was reported that one reason the KLCE and KLCCH did not act more decisively in January or February, despite concerns about market manipulation by Mr Loo being raised by some stakeholders, was that members of its board themselves held positions on palm oil and so felt conflicted from taking action.

The second arises where the CCP does not have sufficient incentive to call a participant who misses margin payments into default because of the possibility that the market could reverse, sparing the CCP from incurring losses (Bignon and Vuillemey 2017). Bignon and Vuillemey argue that this can arise when a CCP is undercapitalised. For example, in a scenario where a participant has missed margin payments because of losses on a directional position on a commodity, the CCP avoids all losses if the CCP does not call the participant into default and the commodity price reverses. While this creates a much greater risk of significant loss if the commodity price continues its trend, the CCP's losses are capped at its equity. If its equity is small and there is a chance that the commodity price will reverse, the CCP may decide to not default the participant. This approach is reckless from a financial stability perspective as it risks much larger losses for the CCP and its failure if the market movement does not reverse, causing instability which impacts all market participants. Note that this approach does not consider several factors such as reputational risks for those making decisions at the CCP.

The third is that once a CCP takes on a defaulting participant's portfolio, it has an incentive to pursue market outcomes which favour the defaulting portfolio, even if doing so departs from best practice financial risk management. The CCP cannot ordinarily act to influence prices in the market for which it clears, however in default management and recovery, CCPs have extraordinary powers including the power to tear up contracts in some circumstances, effectively ending the contract at a price fixed by the CCP. While tear-up may be a useful 'last resort' loss allocation strategy for a CCP, it is likely to severely damage market confidence if the CCP is seen to be undertaking tear-up in an inequitable way, or when other solutions are available.

Bignon and Vuillemey suggest that these perverse incentives influenced CLAM's actions. This may explain why CLAM did not call its largest participant into default when the participant was first unable to meet margin it owed. CLAM may have calculated that the expected value of not defaulting the participant was greater than defaulting it, because the CCP's losses were limited to its relatively low equity and the value of the firm as a going concern. CLAM also attempted to minimise its losses after the default by setting the settlement price of futures contracts higher than the current market price under the 'force majeure' clause in its rulebook. Because the option to tear up at the average settlement price over the previous 20 days was only available when the market was closed, the existence of this clause made closing the market most viable strategy for the CCP to minimise its losses.

3. Inadequate supervision

A common theme of each episode examined in this article is that supervision arrangements for the CCP were inadequate. While supervision will not by itself prevent CCP failure, a competent supervisor with a financial stability mandate can act preventatively, including by promoting sound financial risk management, to make a CCP failure less likely during a stress event.

In the case of CLAM, the power to close the market was held by a minister in the French Government rather than an independent supervisor. This had a significant impact on the eventual failure of the CCP. The French court decision in June 1975 that the minister's decision to close the market was unlawful ultimately caused the CCP to fail. Bignon and Vuillemey argue that CLAM exploited the minister's imperfect knowledge of CLAM's rulebook to claim that a market closure would be legal and thus obtain a favourable decision. It is possible that an independent, expert regulator may have better understood the CCP rulebook and acted differently to preserve the continuity of the CCP.

It also appears that oversight was inadequate at the HKFE. The government took a relatively light touch approach to regulation (Cox 2015). Subsequent examination of the failure in the Davison report described the approach of the Hong Kong Government as 'positive non-interventionism', meaning that the government favoured limited financial regulation in order to promote the development of Hong Kong as a financial centre (Davison 1988). Regulators were described in the Davison report as having a 'general absence of direction', and taking a 'passive and reactive role'. Requests for additional resources from regulators were also ignored by the government.

The KLCCH had a very limited regulatory oversight. Subsequent to the failure, a Malaysian Government report found that the Commissioner of Commodities Trading, the main regulator, did not have any powers and that those in charge of the regulator believed that the local market was self-regulating.

Have these issues been addressed?

The financial risk management frameworks of the 3 CCPs examined were very different from those of modern CCPs. Many of the developments in modern CCP financial risk management have been driven by the implementation of the PFMIs, which are international standards for financial market infrastructures including CCPs that aim to strengthen and preserve financial stability (Bank for International Settlements 2012). In Australia, the principles in the PFMIs are implemented through the Financial Stability Standards for Central Counterparties.

Some of the key elements of modern CCP risk management frameworks include:

- A legally certain rulebook, which sets out the financial risk management framework of the CCP, and is binding on all participants and the CCP.
- Margin requirements on the positions of participants that take into account a number of factors including risks from the positions of participants, concentration of risk from large participants and liquidity risks.
- A default fund, which includes participant and CCP contributions to absorb default losses. Default funds are sized to meet either a 'cover 1' or 'cover 2' requirement, meaning they should be large enough to cover the default of the largest or 2 largest participants respectively.
- Tools to allocate losses to participants rather than the CCP, should default losses exceed a participant's margin and the default fund held by the CCP.

Modern CCPs have in part addressed issues relating to the nature of their participants and clients through membership requirements for participants, which aim to prevent them from bringing risk to the CCP that is disproportionate to the participant's own ability to absorb risk. These include minimum capital requirements for participants that are related to the number of clients the participant is permitted to service, and additional margin for participants who bring concentrated risk to the CCP. Data collection on clients can also help CCPs to understand the risks associated with clients and to account for this as part of their financial risk management. However, in practice the amount of information available to CCPs on clients varies, and it is often left to participants to monitor risk arising from their clients' positions.

Issues relating to the sophistication of clients of participants are more subjective, hard to monitor even when client information is available, and may only appear as an obvious source of risk in retrospect. This source of risk is likely to be ameliorated at CCPs where the largest participants are highly capitalised globally systemically important banks (GSIBs), which are likely to have more diversified and institutional clients.

In some cases, perverse incentives for the CCP that do not align with responsible financial risk management could still exist in the event of a default. If the CCP is unable to liquidate a defaulting participant's portfolio, it could still seek to manage clearing and settlement in a way that favours its interests. However, the right tools are in place to address perverse incentives. Notably, CCPs are required to maintain a minimum level of equity, and contribute to their default fund alongside participants. This ensures that CCPs bear significant losses from poor risk management, and also provides an incentive for all participants to closely monitor financial risk management at the CCP. In addition, supervision by independent regulators would make it difficult for CCPs to behave irresponsibly during default management as the regulators would likely notice this behaviour and may use their powers to intervene.

Supervision of CCPs is generally much stronger now than in the cases examined. The PFMI outline responsibilities of central banks, market regulators and other relevant authorities in supervising financial market infrastructures and implementing the PFMI.

Conclusion

This article identified 3 factors that were highlighted by the failures of the 3 CCPs examined. First, the CCP had a particular make-up of participants and clients which left them vulnerable to the consequences of major price movements. Second, perverse incentives for the CCPs led them to behave in ways that departed from appropriate financial risk management. Third, the CCPs had inadequate regulatory supervision and oversight. These factors, combined with a rapid unwinding of a large price increase, resulted in the CCPs' failure.

These factors have, to a large extent, been mitigated by modern CCP risk management frameworks and stronger supervision, including through the implementation of the PFMI. However, CCPs are often systemically important and their failures could be sudden. It is therefore important for CCP

supervisors and resolution authorities to remain vigilant to these factors, as well as emerging factors, which could cause a CCP failure. It will continue to be important that CCP supervisors and resolution authorities explore possible factors that could lead to a CCP failure, how to mitigate these factors, and how these factors might influence a possible CCP resolution.

Footnote

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References

Asian Wall Street Journal (1984), 'Malaysia Panel to Probe Possible Irregularities in Palm-Oil Dealings', *The Wall Street Journal*, 21 March.

Asian Wall Street Journal (1984), 'Report Hits Malaysia Futures Regulation', *The Asian Wall Street Journal*, 20 August. Available at <http://175.207.73.95/ebd/NP_grp/1984-08/NP290840820AW.pdf>.

Australian Government (2015), 'Resolution Regime for Financial Market Infrustructures - Consultation Paper', The Treasury site, February. Available at <https://treasury.gov.au/sites/default/files/2019-03/C2015-009_resolutionregime_fmi.pdf>.

Bank for International Settlements (2012), 'Principles of Financial Market Infrustructure', April. Available at <https://www.bis.org/cpmi/publ/d101a.pdf>.

Bell S and H Holden (2018), 'Box A: Two defaults at CCPs, 10 Years Apart', *BIS Quarterly Review*, pp 75–76.

Bernanke BS (1990), 'Clearing and Settlement during the Crash', *The Review of Financial Studies*, 3(1), pp 133–151.

Bignon V and G Vuillemey (2017), 'The Failure of a Clearinghouse: Emperical Evidence', Banque de France Working Paper 638.

Council of Financial Regulators (2019), 'Financial Market Infrustructure Regulatory Reforms', November. Available at <https://www.cfr.gov.au/publications/consultations/2019/consultation-on-financial-market-infrastructure-regulatory-reforms/pdf/fmi-consultation-nov-2019.pdf>.

Cox R, D Murphy and E Budding (2012), 'Central counterparties in crisis: International Commodities Clearing House, New Zealand Futures and Options Exchange and the Stephen Francis Affair', *Journal of Financial Market Infrastructures*, 4(3), pp 65–92.

Cox RT (2015), 'Central Counterparties in Crisis: The Hong Kong Futures Exchange in the Crash of 1987', *Journal of Financial Market Infrustructures*, 4(2), pp 73–98.

Davison IH (1988), 'The Operation and Regulation of the Hong Kong Securities Industry', Final Report, 27 May.

Duffie D (2014), 'Resolution of Failing Central Counterparties', Graudate School of Business, Stanford University Working Paper 3256.

Edey M (2015), 'The Transition to Central Clearing of OTC Derivatives in Australia', International Swaps and Derivatives Association Annual Conference, Sydney, 22 October.

Financial Stability Board (2011), 'Key Attributes of Effective Resolution Regimes for Financial Institutions', October. Available at <https://www.fsb.org/2014/10/key-attributes-of-effective-resolution-regimes-for-financial-institutions-2/>.

Financial Times (1984), 'Malaysia Tightens Regulations on Palm Oil Futures Trading', *Financial Times*, 21 August.

Financial Times (1984), 'Moves to Restore Shattered Confidence', *Financial Times*, 19 June.

Hancock J, D Hughes and S Mathur (2016), 'Sources of FInancial Risk for Central Counterparties', RBA *Bulletin*, September, pp 69–75.

Lars P, J Starn and M Holter (2019), 'Star Trader's Default Still Rattling Power Market a Year Later', Bloomberg site, 12 September.

RBA (Reserve Bank of Australia) (2014), 'Submission to the Financial System Inquiry', Financial System Inquiry, March.