



RESERVE BANK OF AUSTRALIA

Speech

Lessons and Questions from the GFC

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It is now just over 10 years since the date that people most associate with the Global Financial Crisis (GFC), namely 15 September, the day that Lehman Brothers filed for bankruptcy. [\[1\]](#) There have been quite a number of articles written in recent months looking back at that time and the period leading up to it. [\[2\]](#) It is interesting to read the differing perspectives on the same set of events, especially those that recount events that I had a ringside seat at, or was even in the ring itself. As I have said recently, it's a bit like the standard line about the sixties, those who can remember the GFC probably weren't there. The sleep-deprived haze that was pervasive at the time affects the memory. Critical decisions were made under extreme duress and fatigue, particularly in the US, which by and large stack up well with the passage of time.

Today I am not going to give another detailed account of what happened. I will talk about some of the events, but the main thing I intend to do is to talk about some of the lessons learned and relearned from the crisis. This list of lessons is by no means comprehensive. I will also discuss some questions that arise from the crisis that remain unresolved, at least in my mind. They are questions which I think should be a focus of the economics profession. Answering them will help guide policymakers should they be faced with similar situations to the one we confronted in 2008.

I am going to talk about both macro and finance today. Some events can be seen through mostly a macro lens with finance playing a lesser role (the seventies in Australia is an example), some events can be seen with the spotlight on finance with macro as a sideshow (e.g., the dotcom bubble). I don't think it is possible to look at the GFC and talk about one without the other.

It is clearly important to integrate finance into macroeconomic analysis. Indeed, the failure to do that is a criticism that is often levelled at central banks and the macroeconomic profession in the aftermath of the crisis. I think this criticism is overstated. One obvious counter example is the work

of Ben Bernanke himself on the Great Depression, Japan and the financial accelerator. His large body of work very much informed the Fed's actions during the GFC.

How should this integration occur? Should finance be built directly into the models that inform (though do not dictate) policymaking decisions? There is a body of work directed at that goal currently underway. ^[3] Building finance into macro models is one approach but by no means the only one. At the very least though, macroeconomics should have an understanding of finance and vice versa. Macroeconomics is like the model of the engine, finance is the oil that lubricates the engine. One can understand how the engine works without really needing to worry about the oil, as long as the oil is flowing. But at least a basic understanding of the plumbing is useful when the oil dries up.

The key lesson that comes from the crisis that I will highlight today is leverage really matters. Leverage significantly magnifies the effect of any shock that hits the economy. Leverage might not start the fire, but it will pour petrol on a burning platform. At the same time, you need to keep the credit flowing to prevent the economy from seizing up.

Ballad of a Thin Man

Something's happening here but you don't know what it is, do you Mr Jones?

That is the Dylan version of the question Queen Elizabeth posed: why didn't anybody see this coming? There were those who saw the storm clouds on the horizon. Michael Lewis wrote a book about some of them. Though often the storm didn't quite take the form these people were expecting. Very few appreciated the extent of the financial interconnectedness and what that implied. For example, one common prediction was there would be a US dollar crisis with consequent calamity, but, in the event, the US dollar appreciated through the crisis.

Looking back on how financial markets reacted through 2007, the onset of the crisis is often dated from BNP Paribas shutting three funds with subprime mortgage exposure on 9 August. That caused a short-lived wobble in equity markets, but after that it was onwards and upwards for much of the rest of the year, with the equity market peaking in November. The equity market was the lens through which the public saw events unfold. So by that metric, 2007 was fairly benign.

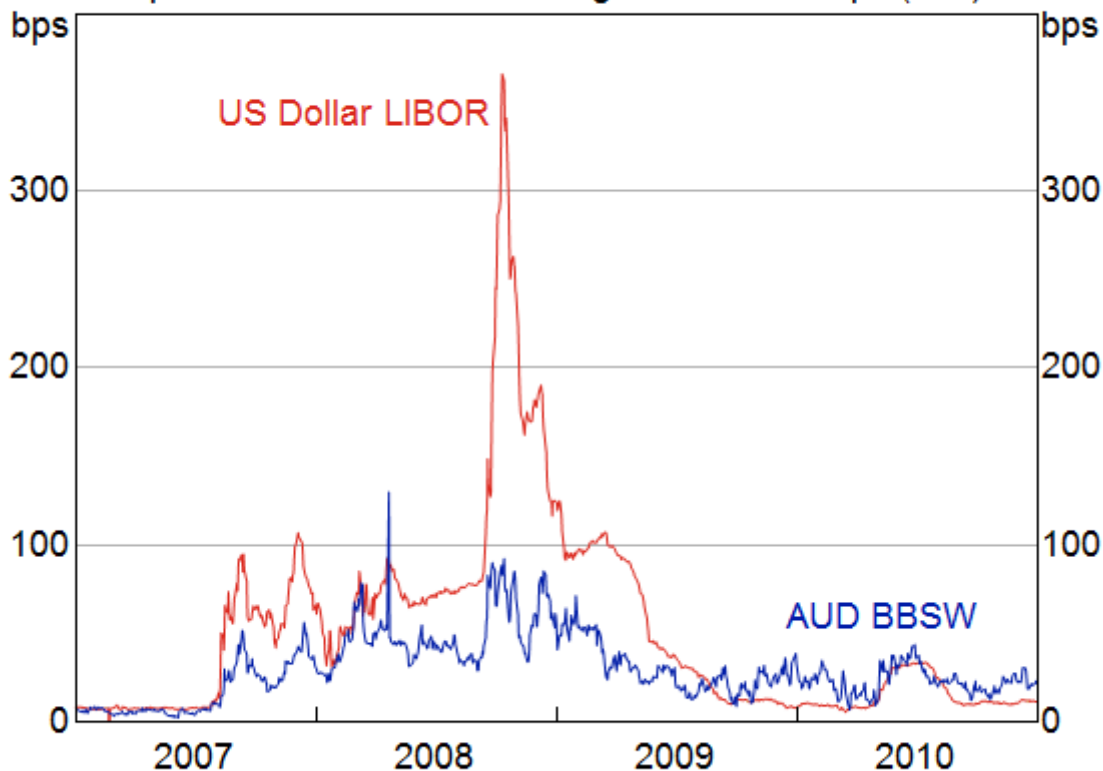
Macroeconomists generally looked at what was unfolding in the US housing market and expected that its spillover to the rest of the economy would be contained. The slowdown would be mild and, to an extent, welcome in containing the inflationary pressures that had been building.

But the fixed income market took fright and got more and more scared through 2007. Uncertainty increased about the quality and value of asset-backed securities and the assets that underpinned them. There was further uncertainty about whose books these assets resided on, generating a marked rise in counterparty risk aversion amongst financial institutions. That is, institutions became less willing to lend to each other, both because of concerns about the financial strength of the counterparty as well as a desire to hoard any available liquidity, should they themselves need it. The indicator of the tension in fixed income markets is the LIBOR/OIS spread (BBSW/OIS here in Australia), which summarises the unfolding of the crisis well (Graph 1).

Graph 1

Short-term Interbank Lending Rates

Spread to three-month overnight indexed swaps (OIS)



Sources: Bloomberg; RBA; Tullet Prebon

These tensions continued to increase with a rolling series of flare-ups, including notably the rescue of Bear Stearns by JP Morgan in March 2008. By this stage, these concerns were increasingly reflected in the equity market too. GDP growth in a number of economies started to slow, but it was not until the fourth quarter 2008 when the economic forces took hold with a vengeance.

Lehmans filed on the Monday morning Australian time. It is interesting to look back at the time. That day was a relatively quiet one in financial markets. Lehmans wasn't the turning point. The actual zenith of the crisis was still to come in the following weeks. AIG, the poster child of financial connectedness, was rescued. TARP was rejected by Congress and then passed after financial tumult broke out. The prime mutual fund Reserve broke the buck. Washington Mutual failed.

Markets were driven by fear, with huge swings in prices. Many of these swings occurred late in the New York trading day, which was early in the Australian day. The correlation between the Australian dollar and the US equity markets through those periods was indicative of the extremely high degree of co-movement across all markets. Markets regularly recorded '25 standard deviation events' in the words of then Goldmans CFO David Viniar. These sorts of events are only supposed to be happening once in the lifetime of the universe, which says something about the risk models that were being used at the time.

My recollection of the worst of it was in the early hours of Saturday morning 11 October after we had been intervening in the foreign exchange market through the Friday evening to provide liquidity into

an almost completely illiquid market. Talking on the phone to the RBA desk in New York, they reported that US Treasuries, the most liquid market in the world, had effectively seized up.

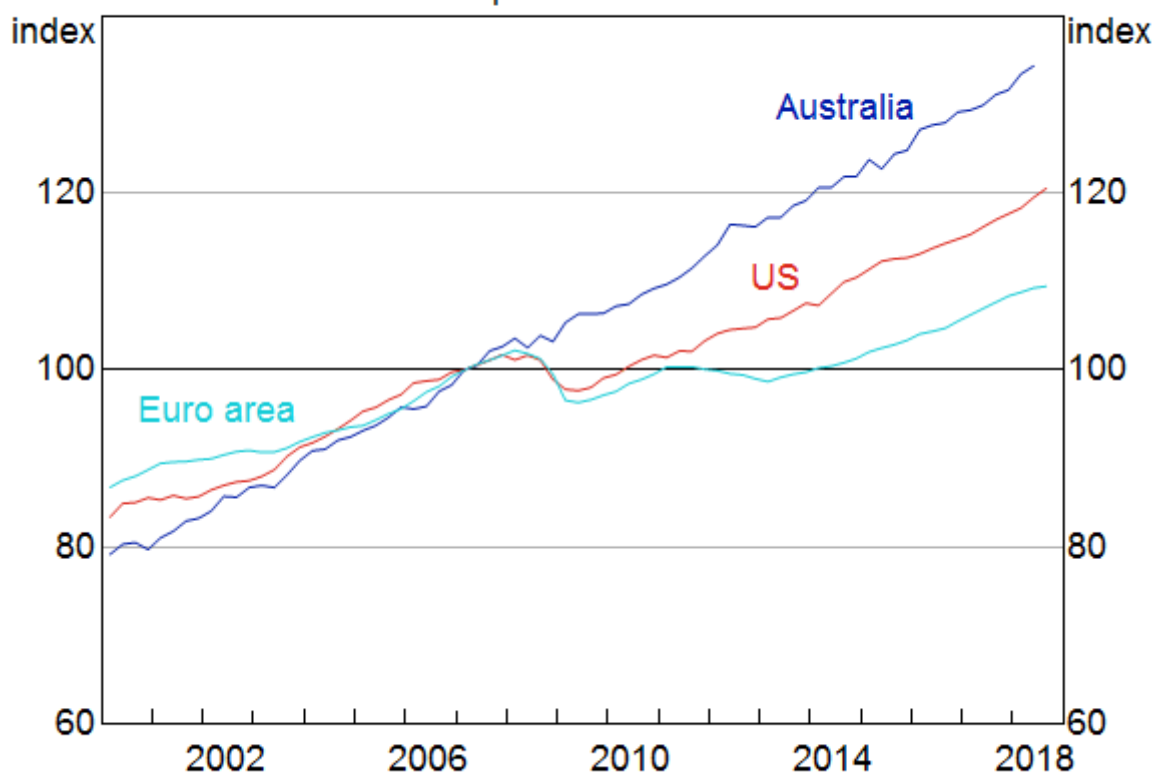
It is worth recounting this, just to recall how dislocative and disruptive these developments were. It was really not clear how this was going to end, except badly.

The fourth quarter of 2008 was bad. Global GDP declined by 1.5 per cent. GDP in the US fell by 2.2 per cent. In Australia, GDP contracted by 0.5 per cent (Graph 2). The impact was particularly severe in global trade, which collapsed as trade finance dried up because of extreme counterparty risk aversion (Graph 3). Companies and banks were unwilling to accept the guarantee of another bank that underpinned the trade lines of credit. They had little confidence they were going to be paid.

Graph 2

Real GDP

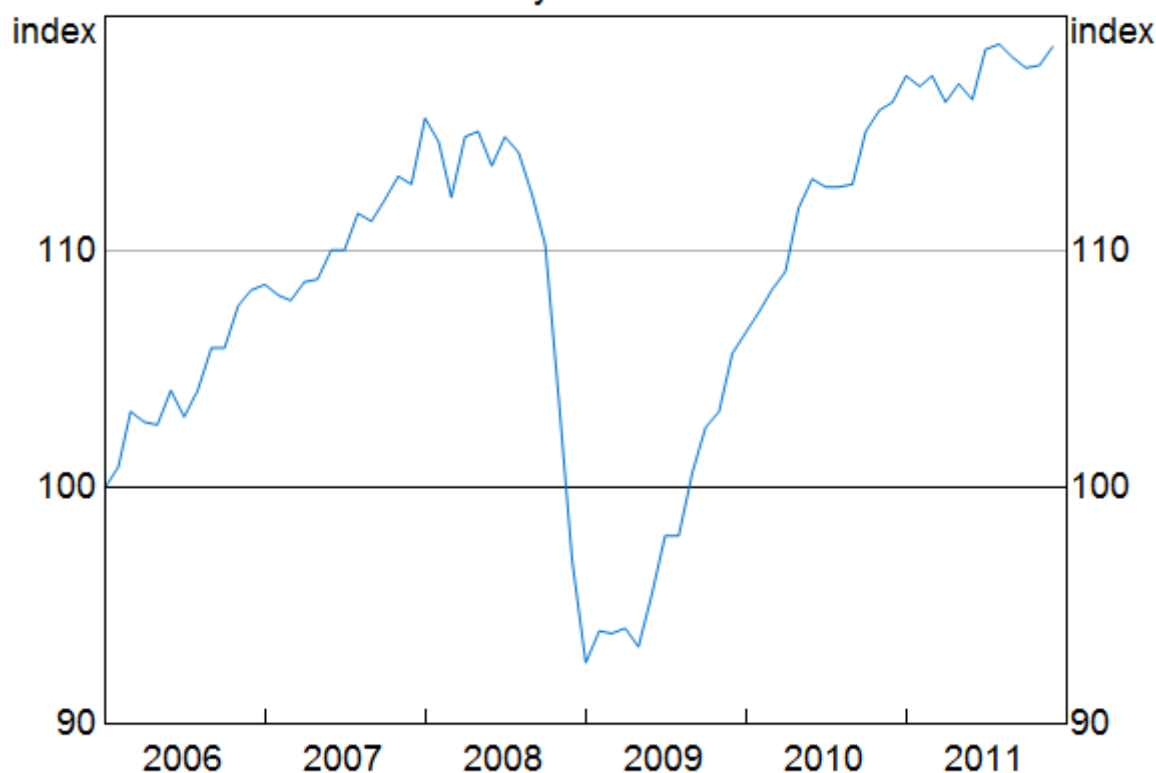
March quarter 2007 = 100



Sources: ABS; RBA; Refinitiv

*Graph 3***Global Merchandise Trade**

January 2006 = 100



Sources: CPB Netherlands; RBA

The breadth and depth of the impact was remarkable. Output fell by more in the Great Depression, but the Great Depression was not synchronised nor as widespread as this was.

These macroeconomic and financial developments very much underpin the nature of the global policy response, both monetary and fiscal.

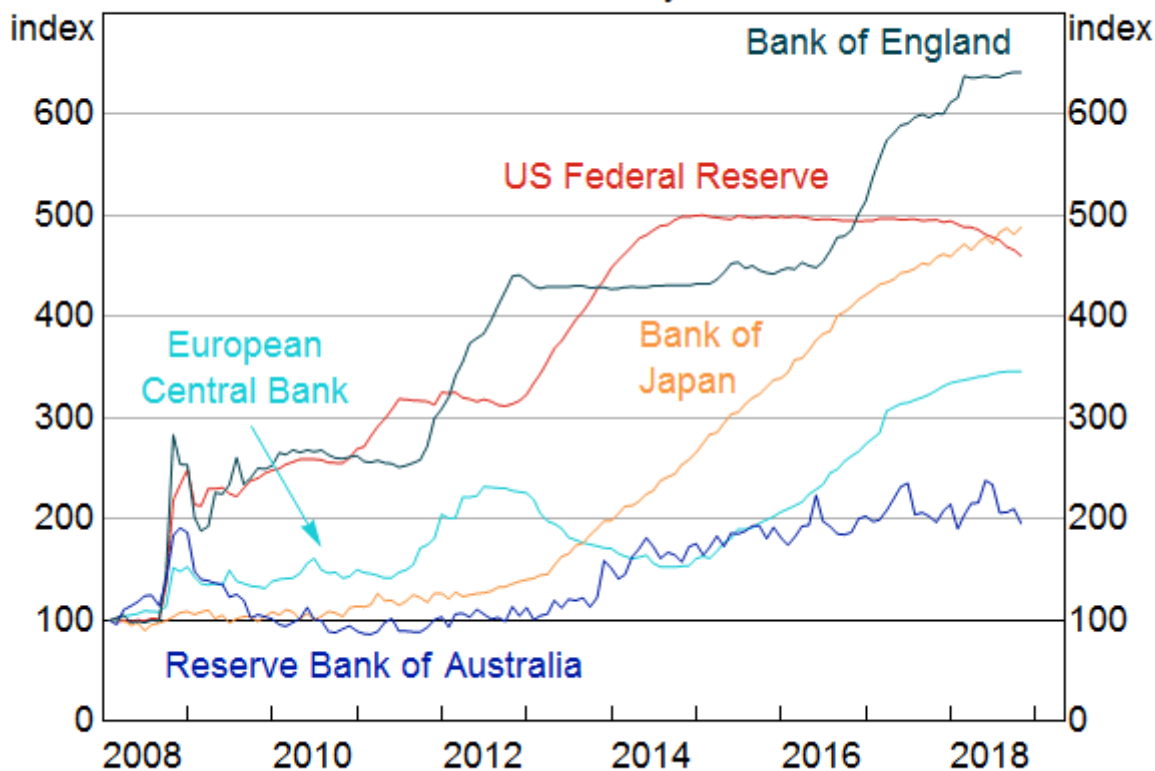
There was a fiscal response in many (though not all) countries, buttressed by the G20 leaders meeting in April 2009. [\[4\]](#)

Central banks responded by reducing policy rates rapidly to very low levels. Some of these actions were coordinated in a hitherto unprecedented manner. Central bank balance sheets expanded rapidly (Graph 4). The re-intermediation by central banks mitigated the withdrawal of intermediation by the banking sector. A part of that increase in the balance sheet addressed the large counterparty risk aversion. Central banks were willing to stand between institutions that were unwilling to deal with each other, as well as accommodate the rapid increase in demand for liquidity. That large increase in central bank balance sheets mitigated the large contraction in the financial sector, which goes a long way to explaining why it has still yet to lead to a marked rise in inflation, despite this being foreshadowed by a number of commentators over the past decade.

Graph 4

Central Bank Balance Sheets

Total assets; 31 January 2008 = 100



Sources: Central banks; RBA; Refinitiv

The central bank actions were designed to alleviate the credit crunch. An alphabet soup of programs was implemented in the US to address the dysfunction in a number of markets, [\[5\]](#) with similar programs in other countries. The aim was to keep the credit flowing and limit the need for fire sales wherever possible.

An important motivation for this first phase of quantitative easing (QE) in the US and elsewhere was addressing the market dysfunction. Indeed, for a time, the Fed characterised it as credit easing. This first phase of QE was particularly effective. My view is that subsequent phases of QE had diminishing returns, though I acknowledge that much of the empirical evidence tends not to find that.

A question worth considering about QE is: if QE was effective on the way in, then surely there must be a large degree of symmetry? Hence we should expect to see similar but opposite effects on the way out. If there were diminishing returns to QE, then it might take a little while before we see the full impact of the reduction in the Fed's balance sheet that is currently underway, but the effect should grow over time.

Turning to Australia, why did Australia come through the crisis better than many other countries? There were a number of contributing factors. [\[6\]](#) Good luck certainly played a role. But the policy actions made an important contribution too. Monetary policy was eased rapidly. The Australian banking system was much less affected by the problems bedeviling banking systems in other countries (partly through good luck). This meant that the transmission of the significant easing in monetary policy to the economy worked pretty much as normal. The exchange rate depreciation

combined with the fact that the Australian economy could adapt flexibly to the depreciation were beneficial.

Fiscal stimulus in Australia in my view was absolutely necessary and was a critical factor behind Australia's good economic outcomes. [\[7\]](#) While one can argue about the exact nature of the implementation, the fact that it was designed to take effect quickly was vital in the circumstances: 'go hard, go early, go to households' as Ken Henry put it.

China was certainly a major contributor to Australia's resiliency. But it is important to remember that China's strong growth at the time was a direct consequence of their large fiscal stimulus. Hence it seems inconsistent to me to argue that China 'saved' Australia, as a result of its fiscal stimulus, while simultaneously dismissing the direct impact of fiscal stimulus here in Australia.

What lessons did we learn (and relearn) from this experience?

Policy capacity matters, both monetary and fiscal. Fiscal space is really important. We still have that in Australia. It is less clear there is fiscal capacity in some other countries.

Monetary capacity matters too. The Reserve Bank has repeatedly said that our expectation is that the next move in monetary policy is more likely up than down, though it is some way off. But should that turn out not to be the case, there is still scope for further reductions in the policy rate. It is the level of interest rates that matters and they can still move lower. We have also been able to examine the experience of others with other tools of monetary policy and have learned from that. Hopefully, we won't ever have to put that learning into practice. QE is a policy option in Australia, should it be required. There are less government bonds here, which may make QE more effective. But most of the traction in terms of borrowing rates in Australia is at the short end of the curve rather than the longer end of the curve, which might reduce the effectiveness of QE. The RBA's balance sheet can also expand to help reduce upward pressure on funding, if necessary, as occurred in 2008. [\[8\]](#)

Finally, the floating exchange rate matters and remains an important shock absorber for the Australian economy.

Everything Flows

I will now step into the plumbing and talk briefly about the lessons learned on liquidity provision and other measures undertaken to keep financial markets functioning as best as possible.

The RBA's balance sheet expanded in Australia for a number of reasons. [\[9\]](#) Exchange settlement balances at the RBA increased as banks' preference for liquidity increased. We were able to accommodate this in our daily market operations. Part of the increased demand for liquidity arose from the large rise in counterparty risk aversion that I referred to earlier. We also offered more repos at longer terms to our counterparties, which saw our domestic repo book approximately double in size and the average maturity increase from 20 days to four months. This helped to provide some additional certainty to funding and mitigate some of the upward pressure on bank funding costs.

The balance sheet of the central bank, and that of the public sector more generally, has the capacity to intertemporally smooth more than any other balance sheet in the economy, be it financial

institutions, corporates or households. The capacity to do this is particularly important when you are dealing with a systemic risk event, as was the case in the GFC. The central bank can intermediate extreme counterparty risk, functioning as much as intermediary of last resort as lender of last resort.

Another example of this was the provision of the FX swap lines. [\[10\]](#) These facilities were introduced to address the global shortage of US dollars (outside the US), which was causing a substantial dislocation in swap markets. In our case, we were able to intermediate the provision of US dollars into the Asian time zone, where this shortage was particularly acute. By the end of the trading day in the US, these shortages had often abated. Note that the swap lines were not about providing US dollars to the Australian banks to meet US dollar obligations. The Australian banks were predominantly funding Australian dollar assets (the hedges on their US dollar borrowing provided them with the US dollars as these matured). They needed Australian dollars rather than US dollars.

On 12 October, the Australian Government introduced a guarantee on wholesale debt and deposits. This followed on from the introduction of the guarantee in Ireland on 30 September. With the guarantee in place in many other countries, Australian banks would have been at a significant disadvantage in terms of funding costs without the guarantee. In addition, the guarantee allowed the banks to access another group of investors who had an appetite for sovereign credit but not bank credit.

It is interesting to consider the question of how much the guarantee addressed the issue of quantity or price. There was a period of time where debt markets were closed at any price in the last quarter of 2008. But at some point it became more an issue of price rather than quantity. As an indication of the price that might have had to be paid, Goldmans issued a bond around this time at a spread of 500 basis points. It is also worth noting that short-term funding continued to be issued by the Australian banks without the need for a guarantee.

Both the RBA operations and the government's funding guarantee were priced such that usage would decline as market conditions improved, and, indeed, that is what happened. The many Fed facilities introduced to address market dysfunction were priced the same way. That is an important lesson which has been around since the time of Bagehot. These facilities were introduced to facilitate the flow of credit to the real economy at a reasonable price and, in some cases, alleviate the need for asset fire sales, which have the capacity to tip markets and the economy into a worse equilibrium. [\[11\]](#)

It is also worth noting that the depreciation of the exchange rate also helped out on the funding side. With a lower exchange rate, a given amount of \$US funding translates into more Australian dollars to fund Australian dollar assets. Unlike in some other countries, the maturity-matched hedging of the banks' offshore funding meant there was no issue of currency mismatch. Indeed the CSAs (Credit Support Annexes) associated with those hedges actually provided a short-term source of additional funding. [\[12\]](#)

Finally, the similarity of the business models of the Australian banks was probably beneficial in the GFC. There was not much to differentiate between them, which meant that the counterparty uncertainty present in other banking systems was nowhere near as prevalent here.

The Australian banks' similarity is not so obviously beneficial in the current circumstance. Their similar behaviour and similar reaction functions to events such as falling house prices run the risk of amplifying the downturn in the housing market.

The crisis very much demonstrated the critical importance of keeping the lending flowing. The lesson is that countries that did that fared better than countries that didn't. That lesson is relevant to the situation today in Australia, where there is a risk that a reduced appetite to lend will overly curtail borrowing with consequent effects for the Australian economy.

Karma Police

After the crisis has come the regulatory response, coordinated by the Financial Stability Board (FSB). ^[13] In the banking space, the regulation has included:

1. The Basel capital standards have required the banks to hold more capital thereby reducing leverage.
2. The Liquidity Coverage Ratio (LCR) had addressed liquidity/runnable funding.
3. The Net Stable Funding Ratio (NSFR) has addressed funding mismatch/maturity transformation.
4. The Volcker rule (in the US), and increased balance sheet costs more generally, have reduced banks' capacity to provide services such as market-making and repo in other jurisdictions.

The first of these has clearly reduced the leverage in the core banking system. Some argue that the leverage should be reduced further (see below), but unambiguously banks hold more capital than they did pre-crisis.

The enhanced liquidity regulation in Australia has been in place since the beginning of 2015, and its effects have been present even before then as the banks adjusted their funding and assets to meet the new requirements. In other parts of the world, I think the effect of the liquidity regulation has been diluted by the large liquidity provided by the greatly expanded central bank balance sheets.

As the Fed balance sheet is shrinking, it is likely that the liquidity regulation will start to bite more in the US. Indeed it is possible we are starting to see some effects now, not necessarily in aggregate, but in particular parts of the money markets.

As important as the liquidity regulation is, in my view, asset quality matters more than funding in the end. ^[14] If asset quality remains sound, as a creditor of the bank, I should be confident of being repaid. An example of this is to compare the German domestic banks and the Australian banks. The German banks were predominantly deposit funded. However, with relatively low returns on offer in Germany, they sought out higher-yielding assets offshore including RMBS (residential mortgage-backed securities) and CDOs (collateralised debt obligation) in the US. In contrast, the Australian banks utilised more wholesale funding but were able to earn high returns on their domestic Australian assets. During the crisis, the German banks were faced with much greater asset quality issues than the Australian banks. They had \$US asset positions that were difficult to fund in the market, notwithstanding the fact that their funding (in euros) is regarded as more stable.

One (intended) impact of the Volcker rule and similar regulations is that banks have retreated from their former role as market makers and risk warehouseers. This was by design, to ensure that the core part of the intermediation process would not be affected by concerns about the quality of assets on their books accumulated through these activities, particularly given the difficulty in distinguishing between risk warehousing and speculation (which can be observationally equivalent).

What does this imply for market dynamics? It is distributing the risk from the banking sector to real money such as asset managers. That is fine in principle, as asset managers have more capacity to absorb and manage the risk with less disruption to the real economy. But it still remains an open question as to how quickly people with deployable capital respond to dislocations in market prices, given that the banks play a considerably smaller role.

That said, one should be careful not to look at the past with rose-coloured glasses. Banks didn't rush in to catch a falling knife when asset prices were falling. Liquidity pockets occurred at least as much in the past, with one good example being the frequency of large big figure movements in foreign exchange rates. Bid-ask spreads used to widen a lot in the past too. The ultimate widening in bid-ask spread back then was not to answer the phone.

In addition, the market liquidity provision mechanism is now more machines and less people. The shape of liquidity has changed and with it market dynamics in a stress environment. The potential volatility of markets has increased (even though actual volatility has generally been low).

In such circumstances, some have talked about central banks acting as market-maker of last resort, stepping in to provide liquidity in a dislocated market (like foreign exchange intervention). This is an interesting question to consider. I think it is a mischaracterisation to call this market-making. It is more likely the central bank will be the buyer of last resort. It may well be some time before the central bank can sell on the asset at a reasonable price. This might well be justified to prevent fire-sale dynamics taking hold, but it should be recognised for what it is, which is not market-making. The potential implications for central bank balance sheets also need to be thought through.

One lesson from any number of crises past is that it is almost inevitable the next crises will originate somewhere different. The inevitability of this in part arises because of the reforms introduced to address the sources of the previous crisis. So where might one possible location of the next crisis lie?

To me, one possibility is that it will involve central counterparties (CCPs). They have a high degree of interconnectedness, considerably greater than before, and very much sit at the heart of the financial system today. Their resilience is of first order importance, as they potentially constitute single points of failure. Much has been done to increase their resilience, recovery planning and resolvability already, including by my colleagues at the RBA. The FSB has a work program to address CCP issues, but it remains a work in progress.

How Much Is Enough?

Finally, I will pose a critical, but unresolved, question: what is the right amount of leverage in the system? When is there too much?

Leverage was at the heart of the GFC. Leverage in the banking system and highly leveraged non-bank institutions like Bear Stearns and Lehmans played a fundamental role in significantly amplifying the crisis. Excess leverage in housing sectors, such as those in the US, Ireland and Spain, was incredibly damaging. This has led to the long-lived effects we still see today, both economic and political.

But we still don't really have a great handle on what level of leverage is dangerously excessive for governments, households, banks and corporates. This surely is a major challenge for the economics profession to address.

As I said earlier, banks have increased capital and reduced leverage. But those such as Anat Admati still make the argument that further reduction in leverage is necessary. [\[15\]](#)

In terms of government, public debt is sustainable until it is not. It is not at all clear whether there is a threshold of sustainability. We have seen crises erupt at very different levels of public debt. Public debt in Japan is currently at 240 per cent of GDP, but there has not been a crisis. We have seen other countries have debt crises at considerably lower levels of debt to GDP. The market can turn on these countries very quickly.

We do know that unhedged borrowing in foreign currency significantly increases the vulnerability. And, relatedly, the European situation highlights the issues that arise when the government doing the borrowing and the central bank are part of the same currency union but not the same country.

On the private sector side, what are the appropriate metrics?

Corporate debt sustainability is assessed in terms of debt to equity ratios or serviceability. It is probably the form of debt about which we have the best understanding of sustainability.

But what about household debt? Debt to income is commonly used, but that is dividing a stock by a flow, a metric not commonly used for corporates. We can look at household leverage, but that is very much dependent on the value of the denominator, house prices in this case, and we know they can decline quite rapidly. Serviceability can be a useful metric, but we don't have a good sense of sustainability at the aggregate level. [\[16\]](#) The quality and distribution of household debt matters as well as the level. The policy measures implemented in Australia over recent years have been aimed at improving the quality, and hence sustainability, of household debt. [\[17\]](#)

While acknowledging that household debt is higher in Australia than many other countries, there is little to form a strong conclusion about how much is too much. [\[18\]](#)

How much debt is enough and how to best manage the risks are two of the large questions remaining unanswered, ten years after the GFC.

History Never Repeats?

To conclude, the GFC provided many lessons, some old, some new. One of the main lessons was an old one: leverage matters.

Leverage can turn a manageable macroeconomic event into a very hard to manage crisis. The regulatory response has been aimed at addressing this by reducing the leverage in the core of the financial system, while being mindful that the risk and leverage is not excessively relocated elsewhere.

The second lesson is that timely policy responses are effective. In a crisis, go fast and go hard. Don't die wondering.

The third lesson is that the plumbing can sometimes really matter. Keep the credit pipes flowing.

Fourth, targeted policy responses/interventions are effective. Use Bagehot pricing, where these interventions are priced to work in bad times but not in the good times.

But the questions of how much debt is enough and how much is too much remain unresolved.

The lessons learned from the GFC will be useful, provided they are not forgotten. But there will be new challenges ahead and the source of the next crisis will probably be different.

History does not repeat itself but it often rhymes.

Endnotes

- [*] Thanks to Lara Pendle and Christian Vallence for their assistance. Particular thanks to James Aitken, Morten Bech, Ulrich Bindseil, Matt Boge, Jean Pierre Danthine, Bill Dudley, Paul Fisher, Trish Mosser, Hiroshi Nakaso, Francesco Papadia, Simon Potter, Roberto Schiavi, Chris Ryan, Brian Sack, Chris Salmon and James Whitelaw as well as other members of the BIS Markets Committee for many helpful conversations over the past decade. The GFC playlist for this speech is Bob Dylan, Teenage Fanclub, Radiohead, You Am I, Split Enz.
- [1] The label 'GFC' was an export from Australia to the rest of the world. Luckily we did not import the Great Recession to balance the trade ledger.
- [2] Brookings provide a comprehensive summary of accounts from a US perspective: Brookings (2018), 'Day 1: Responding to the Global Financial Crisis', Brookings.edu site, 11 September. Available at <<https://www.brookings.edu/events/day-1-responding-to-the-global-financial-crisis/>>. See also Shin HS (2018), 'Reflections on the Lehman collapse, 10 years later', Speech at the Bank for International Settlements, 17 September.
- [3] One example that has already borne some fruit is the work of Simon Gilchrist in succinctly including the financial channel in macro models via credit spreads: Faust J, S Gilchrist, JH Wright and E Zakrajsek (2013), 'Credit Spreads as Predictors of Real-Time Economic Activity: A Bayesian Model-Averaging Approach', *The Review of Economics and Statistics*, MIT Press, 95(5), pp 1501–1519, December.
- [4] Leaders of the Group of Twenty (2009), 'London Summit – Leaders' Statement', 2 April. Available at <https://www.imf.org/external/np/sec/pr/2009/pdf/g20_040209.pdf>.
- [5] Logan L, W Nelson, P Parkinson (2018), 'Responding to the Global Financial Crisis What We Did and Why We Did It: Novel Lender of Last Resort Programs', Brookings preliminary discussion draft. Available at <<https://www.brookings.edu/wp-content/uploads/2018/08/02-Novel-LOLR-Prelim-Disc-Draft-2018.09.11.pdf>>.
- [6] Kearns J, 'Lessons from the financial crisis: an Australian perspective', in J Braude, Z Eckstein, S Fischer and K Flug (eds), *The Great Recession: lessons for central bankers*, 2011, MIT press, pp 245-68.

- [7] Hence I would endorse the assessment of Treasury on the effectiveness of these actions <https://treasury.gov.au/speech/the-return-of-fiscal-policy/>. See also <https://treasury.gov.au/speech/the-9th-caixin-summit-global-challenges-global-solutions/>.
- [8] Debelle G (2008), '[Market Operations in the Past Year](#)', Speech at the 2008 FTA Congress, Melbourne, 31 October.
- [9] Debelle G (2010), '[The Evolving Financial Situation](#)', Speech at the Women in Finance Lunch, Sydney, 16 February.
- [10] Sheets N, E Truman, C Lowery (2018), 'Responding to the Global Financial Crisis What We Did and Why We Did It. The Federal Reserve's Swap Lines: Lender of Last Resort on a Global Scale'. Brookings preliminary discussion draft available at <https://www.brookings.edu/wp-content/uploads/2018/08/14-B-International-Swaps-Prelim-Disc-Draft-2018.09.11.pdf>.
- [11] Debelle G (2013), '[Remarks on Liquidity](#)', Address to the Australasian Finance and Banking Conference, Sydney, 17 December. See also Carlson M and M Macchiavelli (2018), 'Emergency Collateral Upgrades', Finance and Economics Discussion Series No 2018–078.
- [12] Margin was posted by the banks' swap counterparties as the exchange rate depreciated. This was in the form of cash or a cash equivalent. This was another way in which the exchange rate was an automatic stabiliser.
- [13] See FSB (2014), 'Overview of Progress in the Implementation of the G20 Recommendations for Strengthening, Financial Stability', Report of the Financial Stability Board to G20 Leaders, November. Available at <http://www.fsb.org/wp-content/uploads/Overview-of-Progress-in-the-Implementation-of-the-G20-Recommendations-for-Strengthening-Financial-Stability.pdf>.
- [14] Debelle G (2011), '[Collateral, Funding and Liquidity](#)', Address to Conference on Systemic Risk, Basel III, Financial Stability and Regulation, Sydney, 28 June.
- [15] Admati R, P DeMarzo, M Hellwig and P Pfleiderer (2018), 'The Leverage Ratchet Effect', available at <https://www.gsb.stanford.edu/faculty-research/publications/leverage-ratchet-effect>, *The Journal of Finance*, February, 73(1), pp 145–198.
- [16] Debelle G (2004), 'Macroeconomic Implications of Rising Household Debt', available at <https://www.bis.org/publ/work153.htm>, BIS Working Papers, No 153, 1 June.
- [17] Debelle G (2018), '[Assessing the Effects of Housing Lending Policy Measures](#)', Remarks at FINSIA Signature Event: The Regulators, Melbourne, 15 November.
- [18] One part of the explanation for the relatively high level of household debt in Australia is that the household sector owns the rental stock, where in other countries it is often owned by corporations. See Bullock M (2018), '[The Evolution of Household Sector Risks](#)', Speech at Ali Group, Albury, 10 September.