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Dedicated to the memory of Roger Perry (1959-2018)

Roger made an enormous contribution during his time at the Reserve Bank, and is deeply missed by his colleagues.

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Aspects of implementing unconventional monetary policy in New Zealand

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This article provides an overview of the experience with unconventional monetary policies since the global financial crisis of 2007/8, and assesses the scope for unconventional monetary policy in New Zealand. While there is no need to introduce unconventional monetary policies in New Zealand at this time, it is prudent to learn from other countries' experiences and examine how such policies might work in New Zealand if the need arises.

We find there is potential to utilise unconventional monetary policies. However, given the specific characteristics of New Zealand capital markets there are limitations on the extent that unconventional policies can be applied, and the instruments that can be used. Furthermore, in a small open economy, such as New Zealand, the way that unconventional policies affect the economy may differ from the experiences of larger countries. Certain risks are associated with unconventional policies that would need to be managed. Consequently, it will be important that the Reserve Bank communicates on the objectives and nature of any unconventional policies that may be implemented.

The Reserve Bank will continue to monitor other countries' experiences with unconventional policies and undertake further research as New Zealand's financial markets evolve.

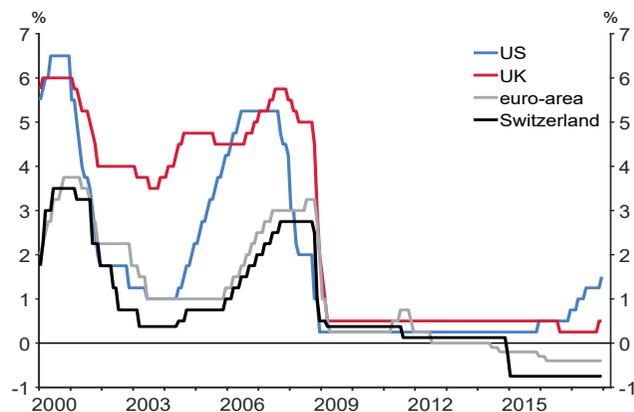
1 Introduction

In the wake of the global financial crisis of 2007/8, central banks in several advanced economies found it necessary to reduce their policy interest rates to near zero (figure 1). However, many economies still needed further stimulus due to the deep recessions and sluggish recoveries they were experiencing. As a result, some central banks introduced what were termed "unconventional" monetary policies to further ease financial conditions and provide additional stimulus for output and inflation. These policies included negative policy interest rates, large-scale asset purchases (LSAPs), and targeted term lending to the banking sector.² Some of these policies are still in place today,

¹ Since drafting this article, Sarah Drought has left the Reserve Bank of New Zealand. The authors would like to acknowledge the very useful feedback received from a range of Bank staff, and from colleagues at the New Zealand Treasury.

² This article does not cover special liquidity facilities that many central banks introduced during the GFC to mitigate the worsening stresses in financial markets. These were aimed at improving functioning in short-term money and funding markets, and were part of central banks' lender of last resort role, rather than for monetary policy purposes. See Cassino and Yao (2011) for more details.

**Figure 1
Policy
interest rates
in selected
countries**



Source: Reuters.

although central banks in some countries, such as the United States, have begun unwinding unconventional policy.

In New Zealand, the Reserve Bank’s primary tool for monetary policy – the Official Cash Rate (OCR) – has remained above zero. As such, the Reserve Bank has continued to implement monetary policy in the “conventional” way, by changing the OCR to influence interest rates in the economy and thus financial conditions more broadly. Even though the OCR remains positive, it has been at an historic low of 1.75 percent since November 2016. A major shock to the economy could quickly see the policy space disappear. For example, during the global financial crisis in 2007/08, the Reserve Bank cut the OCR from 8.25 percent to 2.50 percent.

Estimates of the neutral rate – the level of interest rates that is neither contractionary nor expansionary – have also fallen in New Zealand and

abroad.³ That means central bank policy rates are expected to be lower on average than in the past. As a result, the probabilities of policy interest rates remaining near, or falling to, zero have increased.⁴ This is less of a concern if unconventional policy measures are effective in helping central banks achieve their objectives. As will be discussed, the effectiveness of unconventional policies depends on the structure of each countries financial markets, and the circumstances in which they are introduced.

The Reserve Bank is not projecting a sharp decline in the OCR currently, but it is important that the Bank is prepared for such a scenario by researching unconventional policy options and the issues associated with their implementation. This article outlines some of the options available to the Reserve Bank, drawing on the experience from other countries and taking account of specific features of New Zealand’s financial markets. In section 2, we discuss the main unconventional monetary policies that have been used by other central banks, focusing on negative interest rates, asset purchases, and targeted term lending to the banking sector. In section 3 we consider issues associated with implementing these policies in New Zealand, and in addition consider the possibility of intervening in the interest rate swap market. We draw some high level conclusions in section 4.

³ In New Zealand, the estimated neutral nominal policy rate has fallen to around 3.5 percent, from about 5 percent a decade ago. See Richardson and Williams (2015) for a discussion of neutral rates in New Zealand.

⁴ Kiley and Roberts (2017) estimate that in the current low interest rate environment in the United States, policy rates could be at zero between one third and two fifths of the time.

2 International experience with unconventional monetary policies

Negative interest rates

Since mid-2014, six central banks have lowered their benchmark policy interest rates below zero.⁵ Negative policy rates were expected to work in a similar way to conventional monetary policy, by lowering interest rates across the yield curve. More specifically, by affecting the cost of short-term wholesale borrowing, negative policy rates were expected to flow through to other interest rates in the economy.

The degree to which central banks are able to set negative policy rates is limited by the existence of physical currency (cash), which cannot experience a negative nominal interest rate. Holders of electronic accounts will be prepared to accept negative rates up to the point that the additional costs of holding physical currency - storage costs, insurance costs and transport costs - become lower than the cost of negative rates. Beyond that, households and businesses will prefer holding cash, reducing the effectiveness of negative rates.

The experiences of central banks so far have shown that policy rates can be modestly negative without setting off an immediate portfolio shift into cash, or impairing the functioning of key financial sector firms. The transmission into money market rates and capital market rates (that is,

⁵ Negative policy rates have been implemented in Denmark, Japan, Hungary, Sweden, Switzerland, and by the European Central Bank. The largest negative policy rate implemented has been in Switzerland with a 3 month LIBOR CHF target range of -1.25 percent to 0.25 percent.

government or corporate bond yields) seems to have occurred relatively seamlessly.

The transmission of monetary policy to retail deposit and lending rates appears to have remained intact at modest levels of negative interest rates. Banks' deposit rates for corporate and retail customers have generally fallen, with the spread between those rates and the short-term interbank rate (an indication of pass-through) remaining at similar levels to before the implementation of negative policy rates. Switzerland is an exception, however, with the spread between the corporate and retail deposit rates and the interbank rate rising. This suggests that Switzerland, with the mid-point of the policy target range of -0.75 percent, may have approached the limit to which it can reduce the policy rate.

Negative policy rates do not necessarily mean negative retail deposit rates. A positive spread between banks' deposit rates and the central bank policy rate, mean that banks' retail deposit rates have mostly remained positive.⁶ Deposits are an important source of financing for banks, and there appears to have been some reluctance by banks to reduce retail deposit rates below zero. If the pass-through to deposit rates is constrained, it will become more expensive for banks to fund through deposits. To preserve margins, banks may not be willing to reduce lending rates as the policy rate moves lower. There is some evidence that this occurred in Switzerland, where banks' mortgage rates have not fallen to the same degree as interbank rates.

For small open economies, the exchange rate is expected to be an important transmission channel of unconventional monetary policy. Cross-border capital flows respond to changes in cross-country interest rate differentials, and there is no reason to expect this channel to work

⁶ In Switzerland and Denmark, rates for corporate deposits have become negative.

differently with negative interest rates. Indeed, currencies tended to depreciate when negative interest rates were announced.

The experience of central banks so far suggests that central bank policy rates can be pushed modestly below zero with similar transmission to conventional monetary policy. However, it is unclear whether the “effective” lower bound has been tested. There are several indicators to monitor that may indicate that monetary policy transmission is beginning to weaken and the effective lower bound on the policy rate is being reached:

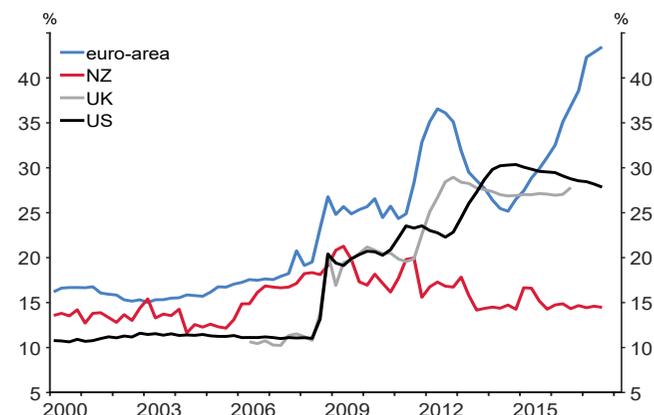
- a rise in demand for physical currency, indicating some switch towards currency to avoid paying negative rates on some assets;
- a failure of banks to pass on lower policy rates to corporate and retail customers;
- an increase in margins on bank lending, potentially as banks respond to any increase in the cost of deposit funding; and,
- a fall in bank profitability, which could result if banks are having difficulty passing a lower policy rate on to deposit and lending rates.

Large-scale asset purchases

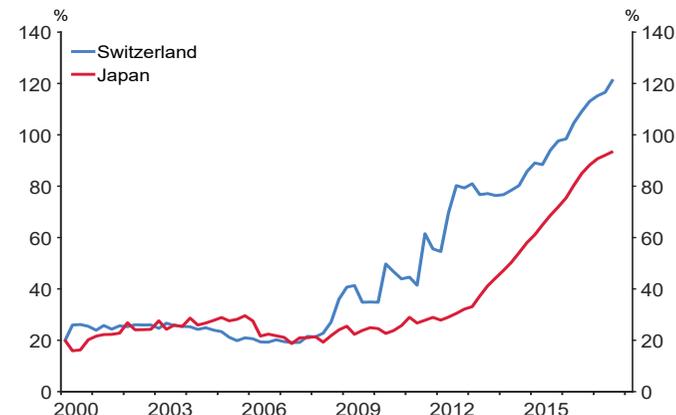
Several central banks have used large-scale purchases of financial assets (LSAPs) to ease financial conditions and support economic growth and inflation. Asset purchases are financed by issuing (or creating) central bank reserves – a highly liquid, zero credit risk instrument – which increases the amount of liquid funds in the economy. As a result, central banks’ balance sheets have grown substantially (figure 2).

Figure 2
Central bank assets
(percent of GDP)

(a) The United Kingdom, United States, euro area, and New Zealand

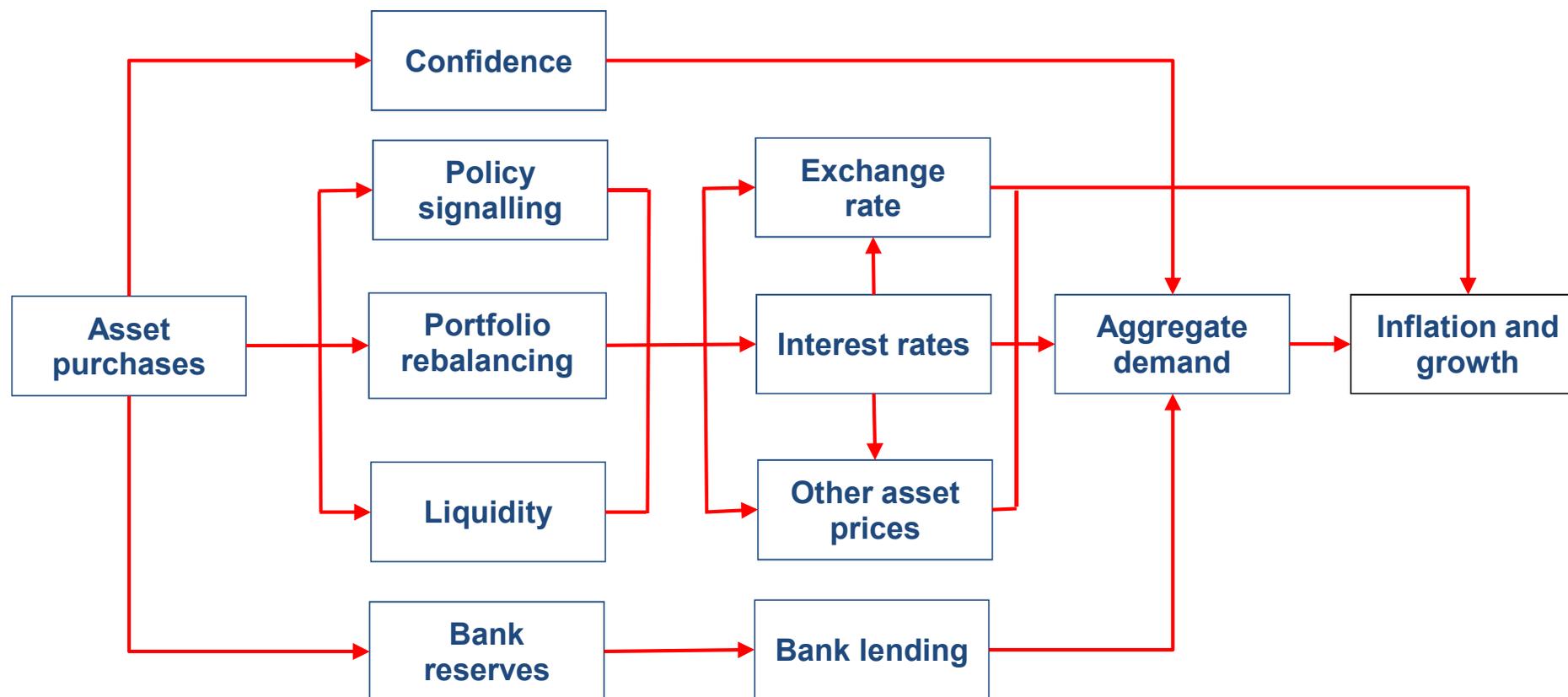


(b) Switzerland and Japan



Source: Haver

Figure 3
Stylised transmission channels of LSAPs to demand and inflation



Source: Adapted from Haldane *et al* (2016).

The assets purchased differed across central banks, but mostly focused on long-term domestic government bonds, with smaller transactions in private assets such as corporate bonds or mortgage-backed securities.⁷ The Bank of Japan implemented a variation to its asset purchase

programme in 2016 by moving from a quantity target for asset purchases to a target for the level of long-term interest rates. As discussed by Bernanke (2017), the resulting “yield curve control” can provide greater precision in estimating the amount of accommodation provided by LSAPs, and can be an efficient strategy when securities available for purchase are limited in quantity. The Swiss National Bank (SNB)

⁷ Mortgage-backed securities were an important part of the US Federal Reserve’s asset purchases, aided by a large and liquid secondary market for mortgage-backed securities which does not exist in many countries, including New Zealand.

purchased significant amounts of foreign assets to ease the persistent upward pressure on the Swiss franc.

LSAPs help to ease financial conditions through a range of channels, in turn supporting aggregate demand and inflation (figure 3). LSAPs lower interest rates and contribute to a flattening of the yield curve through three main channels – policy signalling, portfolio balancing, and liquidity – each discussed below.

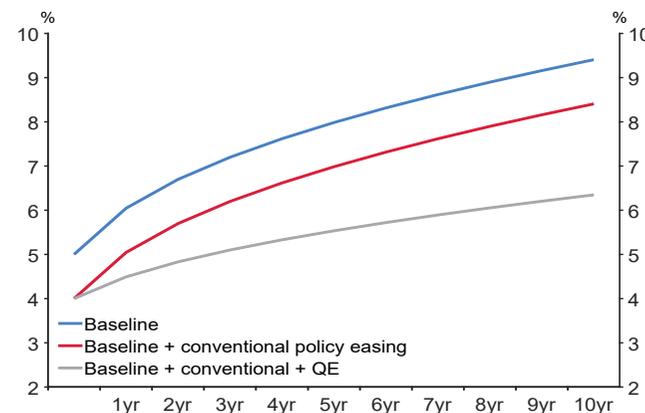
To understand the transmission of LSAPs to long-term interest rates, it is useful to break long-term interest rates down into its two components: the average of expected short-term interest rates over the maturity of the bond, and a risk premium (or term-premium). Expected short-term interest rates reflects the value of the alternative investment options of either investing in a long-term bond, or rolling over investments in short maturities on an ongoing basis. The short-term interest rate is closely linked to monetary policy decisions. Hence, expectations for future monetary policy affect long-term interest rates. The risk premium is time-varying and reflects the risk associated with holding a long-term bond, over a series of short-term instruments. This includes factors such as interest rate risk, inflation risk and liquidity risk.⁸

Conventional monetary policy easing largely affects long-term interest rates by lowering the expected path of future short-term interest rates.⁹ LSAPs also work through this “policy signalling channel”. In addition, LSAPs reduce the risk premium via the “portfolio rebalance” and “liquidity” channels: encouraging a switch into longer term or higher risk

⁸ Typically the risk premium is positive, although estimates of term premium on many sovereign bond yields have been negative in recent years, with one explanation being that the security of holding government bonds has outweighed the term risks.

⁹ Over and above changes in nominal interest rates, monetary policy can also affect real interest rates by influencing inflation expectations of households, firms and market participants.

Figure 4
Stylised
yield curve
scenarios



assets, and reducing the liquidity premium on the purchased assets. Figure 4 provides a stylised representation of how conventional monetary policy and LSAPs affect the yield curve.

Through the signalling channel, LSAPs may suggest to market participants that the short-term policy rate will be lower for longer, reinforcing or enhancing the credibility of any forward guidance. Announcing and implementing LSAPs shows a commitment not to raise rates for some time, as raising rates while purchasing assets would present a mixed policy stance. The experience of central banks shows an important sequencing effect, with asset purchases stopping well before central banks looked to raise rates. LSAPs may also help to reaffirm a central bank’s commitment to their inflation target and help to (re)anchor inflation expectations, by showing that monetary policy can continue to be stimulatory for a prolonged period, notwithstanding a lower bound on nominal interest rates.

The portfolio balance channel is motivated by assuming segmented demand for different securities (i.e. reflecting investors’ different

preferences to hold assets of a particular duration, currency or credit risk). Central bank LSAPs reduce the outstanding supply of the purchased assets, which raises the price and reduces the yield. As investors rebalance their portfolios to alternative assets with similar characteristics, this raises the price and lowers the yield on those assets. Depending on the size and depth of domestic capital markets, this rebalancing may be into either domestic or overseas assets.

Finally, through the liquidity channel, LSAPs can help to calm markets during times of financial stress, and lower interest rates by reducing risk or liquidity premiums.¹⁰

The reduction in market interest rates is expected to stimulate economic activity and inflation in several ways. Lower borrowing costs for firms and households increase the incentives for borrowing and spending. Lower interest rates on safe assets such as government bonds encourages investors to shift into riskier assets – boosting a range of asset prices and improving wealth, which may result in higher spending. A reduction in expected interest rates reduces cross-country interest rate differentials, resulting in downward pressure on the exchange rate which supports net exports and raises tradable goods inflation. In addition, LSAPs reinforce the intent of the central bank to support the economy, reducing uncertainty about the outlook and improving confidence.

A large body of evidence shows that LSAPs were successful in easing financial conditions, through lower bond yields, higher asset prices and weaker exchange rates.¹¹ The forward looking nature of financial markets means that most of the impact occurred on announcement, rather than

when purchases were executed. As highlighted by Gagnon (2016), LSAPs can be especially powerful during times of financial stress, although the signalling and portfolio balance channels should still have a significant effect in normal times. There may, however, be diminishing returns through these channels. In particular, given the lower bound on short-term interest rates, there will be a limit to how far interest rates can be reduced via the signalling channel. Similarly, there is likely to be a lower bound on long-term interest rates (as investors have the option of holding paper currency with a fixed yield of zero) meaning additional purchases might not drive yields much below zero.

What really matters for central banks is whether LSAPs helped central banks achieve their mandates, related to achieving inflation, output and employment goals. While most studies into the effect of LSAPs in the post 2007/8 global financial crisis period find positive effects, they must be treated with caution.¹² In part this is because of measurement issues: LSAPs have been implemented over a relatively short period since the 2007/8 global financial crisis, and previous historical relationships can have been expected to have changed. Overall, early work suggests LSAPs can be a beneficial monetary policy tool in exceptional circumstances. However the nature and extent of the transmission of these policies to inflation and activity is still being established.

Targeted term lending

Targeted term lending to banks can be effective in economies that rely heavily on bank financing, especially if banks' funding costs are elevated, offshore funding availability is constrained, or if credit transmission through the banking sector is impaired. Ultimately, targeted

10 See Haldane *et al* (2016) for more discussion associated with the various transmission channels highlighted in figure 3.

11 For example, see Gagnon (2016), Ball *et al* (2016), Borio and Zabai (2016), Haldane *et al* (2016), and Reza *et al* (2015) for summaries of the international evidence.

12 See Borio and Zabai (2016), table 7 for a summary of the economic impact of LSAPs and a discussion of limitations of this research. See also Haldane *et al* (2016).

lending schemes aim to ease credit conditions for particular sectors of the economy to support aggregate demand and inflation. Targeted lending facilities can complement LSAPs by reinforcing a central bank's accommodative policy stance, and strengthening the transmission of monetary policy by further stimulating bank lending to the real economy.

The Bank of England, the European Central Bank and the Bank of Japan have all used some form of targeted lending schemes, though in much smaller quantities than asset purchases. The programmes have provided collateralised lending to banks over medium terms (about four years) and at concessional rates based on performance criteria for the amount or type of new lending. For example, if a bank meets specific targets for lending growth, the cost of borrowing from the central bank declines, and the amount available for the bank to borrow through the scheme may also rise.¹³ In addition to directly lowering banks' funding costs, the cost of funding through other sources (such as retail deposits or issuance of bank bonds into the wholesale market) might also fall as competition for those sources of funding declines.

There is less evidence assessing the outcomes of these programmes compared to LSAPs, although Churm *et al* (2015) estimate that the first phase of the Bank of England's funding for lending scheme (that ran for 18 months to January 2014) had a peak effect on GDP of 0.8 percentage points, and on inflation, of 0.6 percentage points.¹⁴

Potential risks and costs of unconventional monetary policy

The potential risks or perceived costs associated with unconventional monetary policy – especially related to LSAPs – include the impact that LSAPs could have on market functioning, central bank independence, and financial stability.¹⁵ The concerns regarding financial stability are not unique to unconventional monetary policy, and relate to accommodative monetary policy more generally. Overall, the experiences of central banks so far suggest that the expected benefits for economic growth and inflation have continued to outweigh the potential costs. However, any side-effects from unconventional monetary policies will tend to rise over time, with the balance between the expected benefits and costs deteriorating.

Impaired market functioning

Asset purchases that consumed too much of an asset's outstanding supply could have a detrimental impact on the asset's liquidity, making price discovery harder, and creating difficulties in transacting.¹⁶ If this became acute, the liquidity risk premium could increase, counteracting the effects of LSAPs in decreasing yields. Purchasing government bonds – or other “safe” assets – could also have detrimental impacts on the functioning of other markets, given the role of these assets as collateral in financial market transactions. The impact on liquidity could be a more binding constraint in countries with smaller debt markets.¹⁷

13 For example, the European Central Bank's Targeted Long-Term Refinancing Operations in 2014 and 2016 extended loans with concessional interest rates that could be as low as the European Central Bank's deposit rate of -0.4 percent – well below the marginal cost of term funds for many Eurozone banks. See European Central Bank (2017), Box 5 for more information about the European Central Bank's TLTRO facility, and Churm *et al* (2012) for more information about the Bank of England's Funding for Lending Scheme.

14 The first phase of the FLS had a total drawdown of GBP42 billion, just over 2 percent of GDP.

15 See Reza *et al* (2015) for a broader discussion on potential risks associated with LSAPs.

16 To help mitigate the impact on liquidity, bond lending facilities have been expanded in most countries that have undertaken large-scale purchases of government bonds.

17 For example, the Swedish National Debt Office has noted that liquidity in the Swedish government bond market has deteriorated as a result of the Riksbank's purchases, and that “the market for government bonds is still functioning satisfactorily but the situation has become more strained,” Swedish National Debt Office (2017).

Risks to central bank's balance sheet and independence

LSAPs increase the risks to the central bank's balance sheet, exposing it to both gains and losses on its asset holdings. The central bank would be exposed to losses if long-term interest rates rose unexpectedly. While profit maximisation generally isn't an objective of central banks, and central banks can continue to operate effectively with negative net worth,¹⁸ any losses would ultimately be reflected in reduced dividend payments to the government. This fiscal dimension doesn't exist to the same extent with conventional monetary policy¹⁹, and has raised concern about the implications for central banks' independence and institutional reputation.²⁰

LSAPs can also be profitable for the central bank and government because on average the yields on longer-term assets are higher than those on its short-term liabilities. However, if LSAPs push the term premium on long-term bonds below zero, then marginal expansion of the balance sheet would reduce expected profits.

The fiscal effects of LSAPs go beyond the direct balance sheets of, and flow of funds between, the central bank and the government. LSAPs reduce the long-run burden of public debt by lowering the borrowing cost of government, and by supporting higher economic activity and tax revenues. Ball et al (2016) conclude that these benefits will outweigh the potential losses on central bank assets in any plausible scenario. However the benefits of LSAPs primarily apply during the period of their

use; as they are unwound, borrowing costs will increase, and in a small and less liquid financial market such as New Zealand, borrowing costs could revert to higher levels than otherwise.

There is also a natural hedge for LSAPs when considering the consolidated government balance sheet. If the central bank incurs losses on its LSAPs programme, it will likely be because the economy recovered more quickly or more strongly than expected, resulting in higher interest rates. In this situation, the government's tax revenues and thus operating balance will most probably have improved, and offset unrealised losses on central bank asset purchases.

Financial stability risks

LSAPs have been successful in reducing interest rates across the entire yield curve. While the transmission of monetary policy through asset prices is an important channel,²¹ an extremely accommodative monetary policy stance (potentially including negative term premiums) could encourage excessive risk-taking in financial markets and contribute to overvaluation in asset markets, whether for bonds, equities, corporate credit, or property.

Sustained monetary accommodation could also "distract" from other significant policy challenges facing the real economy.²² In the downturn following a financial crisis, lower long-term rates could delay any necessary adjustments in reducing indebtedness, whether by households, corporates or governments. An important mechanism

18 For example, central banks in Chile, the Czech Republic, Israel and Mexico have shown that it is possible to successfully meet policy objectives while having negative equity. See Archer and Moser (2013) for a detailed review of central bank finances.

19 The Reserve Bank pays the OCR on bank deposits, and invests in a variety of assets. This creates interest rate risk that can affect Reserve Bank profits, and therefore dividends.

20 For example, Sim (2016) highlights the risk that a larger and riskier balance sheet brings central bank finances into the political debate, inviting political second-guessing and threatening independence. As a result, balance sheet expansions should eventually be reversed.

21 As discussed by Bernanke (2017), the intended effects of monetary easing on asset prices works through economic fundamentals, including the reduced discounting of future returns, expectations of stronger economic growth, and moderate increases in risk-bearing capacity. Asset prices due to those fundamental causes are desirable and pose no significant risk for financial stability.

22 See remarks by Hervé Hannoun, Deputy General Manager, BIS, at the Eurofi High-Level Seminar, Riga, 22 April 2015, <https://www.bis.org/speeches/sp150424.pdf>.

in the recovery from a recession is to repair household and business balance sheets quickly, together with financial structure reform as may be required. Monetary policy can buy time to implement this repair and reform, although it cannot substitute for it.

LSAPs and negative interest rates can erode the profitability of financial institutions, which could have implications for the resilience of the financial system (Borio *et al*, 2015). However, there was little sign that bank profits were eroded in the US and UK after LSAPs were instituted in 2008 and 2009 (Ball *et al*, 2016). Ultra-low yields might have a larger effect on insurance companies and pension fund profitability, given the long-maturity of their liabilities.²³

The risks to financial stability can be mitigated through sound prudential and macro-prudential policies. Overall, major central banks generally do not believe that their policies have led to a material increase in financial vulnerabilities.

3 Unconventional monetary policy in New Zealand

Scope for unconventional policy

A range of options are available to the Reserve Bank to provide additional monetary stimulus if the OCR reached zero, taking into

²³ Borio and Zabai (2016) use the example of pension funds to highlight the potential for counterproductive effects on confidence from LSAPs if, for example, households recognised the need to save more for retirement.

account the international experience with unconventional policies, and the specific features of New Zealand's financial markets. We discuss five of the most viable options: a negative OCR, large-scale asset purchases, purchasing foreign assets and/or interest rate swaps, and targeted term lending. This is not an exhaustive list, and the Reserve Bank's view of unconventional monetary policy options in New Zealand will continue to evolve to reflect developments in New Zealand financial markets, and overseas experience.

The most appropriate policy choices will depend on the particular shock or situation facing the New Zealand economy. The Reserve Bank's over-riding focus will be to achieve its monetary policy objectives, having regard for financial stability. As with all of the Reserve Bank's policy deliberations, any use of unconventional monetary policy will be carefully considered to take account of and minimise the associated costs, not least the ones discussed in section 2 relating to impaired market functioning, risks to the central bank's balance sheet, and risks to financial stability.

Negative OCR

Based on the overseas experience discussed, it would appear that a modestly negative OCR could be implemented in New Zealand. The key consideration is how negative the OCR could go before different segments of the financial market begin to hold cash rather than negative yielding securities. At that point the transmission of further OCR reductions to the wider economy would be hampered.

Private banks, business and retail depositors would face negative interest rates at differing levels of the OCR. The Reserve Bank uses a range of liquidity instruments in its domestic market operations, priced at various spreads to the OCR. Interest rates in overnight wholesale cash

markets tend to trade close to OCR. As a result, banks would likely face negative short-term wholesale rates as the OCR itself turned negative. It is worth noting that a few Reserve Bank facilities are transacted at margins below the OCR. For example, if the OCR fell below 1.5 percent, bond lending facility transactions would be at negative rates.²⁴

The corporate sector would experience negative rates after the banks, and would face the choice of investing in negative yielding fixed income securities or holding physical cash. Raising finance through corporate fixed income securities would also be affected; based on current spreads yields would become negative at an OCR of between -0.20 percent and -0.35 percent.

Retail depositors are offered a range of deposit rates by banks depending on the term. Call deposits are currently priced about 1.35 percentage points below the OCR, while the weighted average of term deposits is about 0.90 percentage points above the OCR. Based on overseas experience, it is likely that banks will maintain call rates as the OCR falls, but reduce term deposit rates in line with the OCR. Banks would be faced with the choice of accepting falling interest margins, or increasing the spread on lending rates. Were this to occur, it would represent a weakening in the transmission of monetary policy.

It is difficult to estimate at which point New Zealand market participants would switch from deposits to holding cash. There is a lack of vault space in New Zealand for storage of large cash amounts. That could give the Reserve Bank time to assess the impacts of negative interest rates in real time. The incentive to invest in cash storage would also be affected by how long the Reserve Bank is expected to hold the OCR at

negative rates. For the large number of small retail depositors, the hurdle for switching to cash is much lower, but by total value their holdings are relatively small.

Overall, it appears that the Reserve Bank could implement negative interest rates, with the potential leakage into cash relatively small in value terms at modestly negative rates.

Large-scale asset purchases

New Zealand's debt markets are small compared to other advanced economies. This creates some challenges for LSAPs in New Zealand and limits the size of any purchases compared to the experience in other countries.²⁵ As shown in table 1, the New Zealand debt market is dominated by New Zealand government bonds (NZGBs). That makes NZGBs the most accessible asset to purchase, although the size of the market will be a constraint compared to larger economies. Overall, based on the current level of NZGB issuance, purchases of NZGBs up to 10 percent of GDP may be feasible, which would be within the precedents set by other central banks in terms of central bank ownership shares.

Comparable data for New Zealand non-government debt (and the breakdown) is not available through BIS statistics. Non-government bonds outstanding in New Zealand are roughly estimated at 35 percent of GDP, comprising 11 percent Kauri bonds, 3 percent Local Government Funding Authority bonds, and estimates of 6 percent for non-financial corporations and 15 percent for financial corporations.

24 It is possible the demand for the facilities would increase if LSAPs were introduced. For example a reduction in liquidity in the NZGB market may increase the occasional demand for the bond lending facility.

25 New Zealand's equity markets are also relatively small, with market capitalisation of the NZX around 50 percent of GDP. See Hunt, Reid and Rosborough (2015) for more details on New Zealand's capital markets.

Table 1
Capital market statistics for selected advanced economies
 (% GDP)

Country	Central bank assets	Total securities	Domestic bonds and international bonds in local currency			Stock market
			Financial corporations	Non-financial corporations	Government	
New Zealand	10	115	30-40			49
Australia	11	202	58	3	44	97
Canada	5	200	22	14	61	103
Euro area	38	182	47	9	74	53
Japan	92	382	51	13	202	115
Sweden	19	341	54	2	27	257
Switzerland	117	261	15	3	14	229
United Kingdom	27	275	36	11	92	136
United States	23	300	81	30	90	99

Source: Ball *et al* (2016), Haver, RBNZ estimates.

Note: Central bank assets up to 2017Q2, while the rest of the data are at 2015Q4.

As described in section 2, LSAPs typically reduce yields on long-term assets through two channels: the policy signalling channel and the portfolio balance channel. Considering the former, LSAPs can send a strong signal that the Reserve Bank expects to keep the policy rate lower for longer, reducing the expected path of the policy rate. Although the Reserve Bank already uses forward guidance by publishing its forecast path for the OCR, asset purchases would reinforce this guidance if the markets' expectation for the future path of the OCR were not aligned with the Reserve Bank's view.

Considering the portfolio balance channel, asset purchases lower yields by compressing the term premium of long-term assets. Purchases of NZGBs by the Reserve Bank would reduce the outstanding supply,

pushing up the price and reducing the yield. The greater the proportion of investors reluctant to switch to alternative assets, the greater downward pressure on the term-premium and therefore the yield on NZGBs. As investors rebalanced their portfolios to alternative assets with similar characteristics, this would raise the price and lower the yield on those assets.

In a small open economy, the portfolio balance channel may be less effective in reducing term premiums and therefore long-term interest rates than in large economies.²⁶ In a highly connected global capital market, a small open economy like New Zealand faces a large set of

26 See Fontaine *et al* (2017).

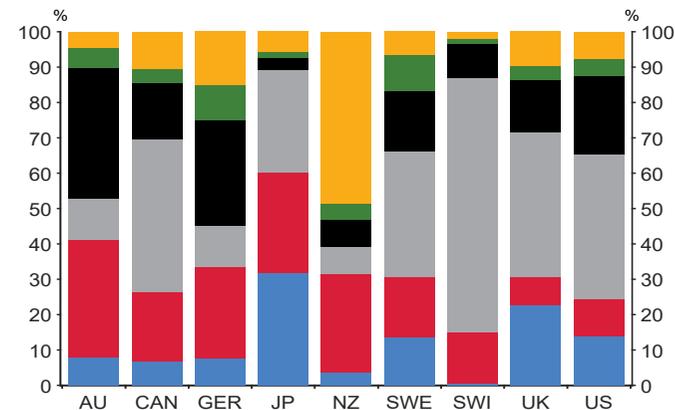
highly substitutable bonds. If investors consider foreign bonds to be close substitutes for NZGBs, investors may be relatively price sensitive, and some purchases could “leak” abroad.²⁷ This could be particularly pertinent in New Zealand because the share of foreign ownership of NZGBs, most of which are held by non-bank or non-official investors, is high compared to other advanced economies (figure 5). If international bond substitution leads to increased demand for foreign currency, then implicitly it is difficult to disentangle the exchange rate and portfolio balance channels.

Term premiums in NZGBs are heavily influenced by developments in term premiums in other countries. There is a large common international component to the term premium, highlighted by the co-movement of term premiums across countries (figure 6). Using the spill-overs framework developed from Diebold and Yilmaz (2009), the Reserve Bank has estimated that about 70 percent of New Zealand’s term premium is driven by spill-overs from the term premium for US and EU bond yields, rather than New Zealand-specific factors. Nonetheless, the idiosyncratic component of around 30 percent of New Zealand’s term premium suggests that there is still some domestic component of the term premium that LSAPs could influence.

While LSAPs may have a more modest effect in reducing long-term yields in New Zealand, this does not necessarily imply that the overall impact of LSAPs on output and inflation are lower. The exchange rate channel is expected to be important, and could provide a greater boost to output and inflation than in a large economy such as the US because: (i) small open economies such as New Zealand may have a greater

27 This contrasts to the case of the United States where the United States’ Treasury market is large and benefits from global reserve status, or the euro area where the large size of the euro-denominated bond market may enjoy better liquidity or higher acceptance as collateral.

Figure 5
 Holders of government debt securities
(share of total)

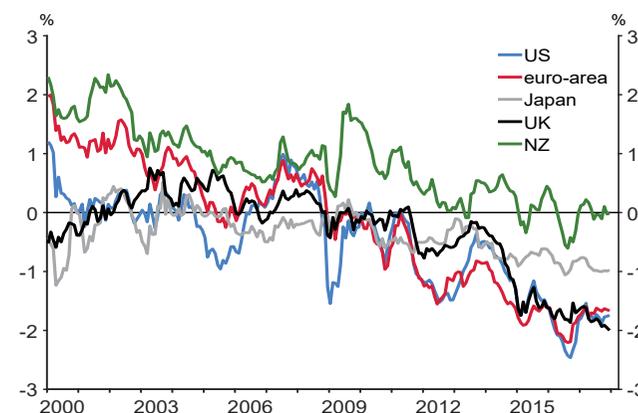


Source: Sovereign investor base estimates by Arslanalp and Tsuda (2012). Data as at 2016Q2.

Note: Compared to RBNZ data, holdings of domestic banks look to have been over-stated at the expense of domestic non-bank holdings, including other financial institutions.

Key: Blue: domestic central bank, red: domestic bank, grey: domestic non-bank, black: foreign official, green: foreign bank, yellow: foreign non-bank.

Figure 6
 Estimated term premium on 10-year government bonds



Source: RBNZ estimates

exposure to trade;²⁸ and (ii) the exchange rate depreciation could be larger if more investors rebalance their portfolios away from New Zealand dollar assets, given the country's small relative size. However, there is limited research into whether the exchange rate channel is more important in small open economies.

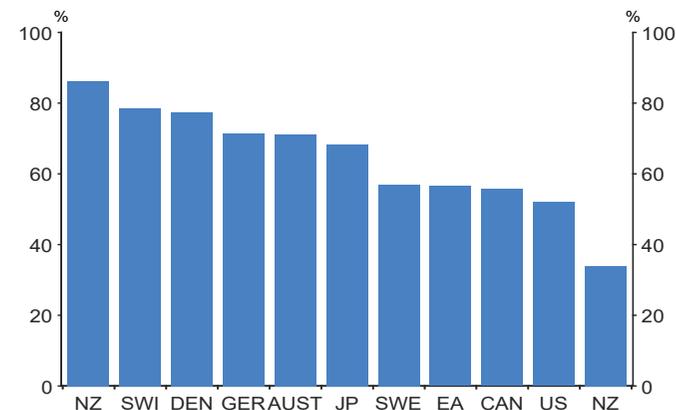
Non-resident investors would be an important segment of potential sellers of NZGBs because they own around 60 percent of the asset class. New Zealand's small capital markets means there is a lack of similar, suitably-rated and liquid New Zealand dollar assets. Consequently much of the portfolio rebalancing would be expected to occur out of New Zealand dollar assets. That should reinforce downward pressure on the exchange rate, over and above the expected depreciation from any narrowing in cross-country interest rate differentials. That said, the potency of the exchange rate channel could be hampered if other central banks are also easing, especially through LSAPs.

Any fall in yields on non-financial corporate bonds would lower the cost of funding for a very small proportion of New Zealand firms.²⁹ This is because around 85 percent of credit to the non-financial sector in New Zealand is financed by the banking sector (figure 7). Consequently, any impact on the cost of borrowing for households and firms will depend on developments in the banking sector, and whether LSAPs lower banks' marginal funding costs, which may then be passed on to banks' lending rates.

28 For example, trade openness (measured by the sum of exports and imports as a share of GDP) in New Zealand is 63 percent compared to 29 percent in the US.

29 Even in countries where LSAPs contributed to a fall in corporate bond yields and an increase in issuance, some of this was focused on refinancing – either to retire existing debt or pay-outs to equity holders via dividends and share buybacks – rather than investment spending. See Klein (2012).

Figure 7
Bank credit
(percent of total credit)



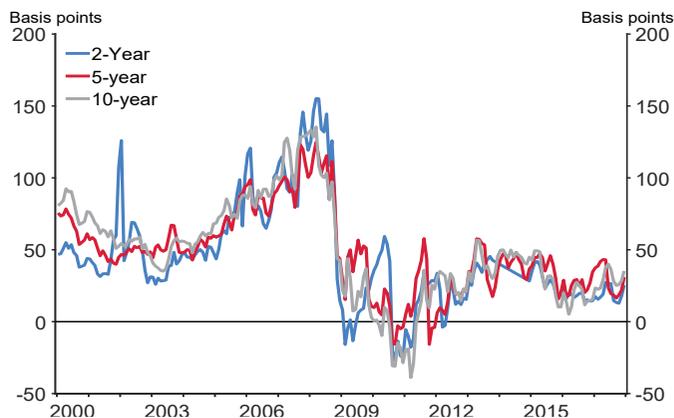
Source: BIS. Note: Credit to private non-financial sector from banks. Data as at March 2017.

To the extent that LSAPs work through the policy signalling channel, interest swap rates – which are a key benchmark rate for banks' funding costs – would also be expected to fall. This would be no different to the transmission of conventional monetary policy. However, it is less clear whether any reduction in the term premium on NZGBs would reduce long-term interest swap rates. Figure 8 shows that the spread between swap and NZGB yields has varied substantially over time.³⁰

The relatively small size of the NZGB market, compared to most countries that have undertaken LSAPs so far, will be a constraint on the scale of purchases that the Reserve Bank can undertake. Outstanding government debt in New Zealand is around 30 percent of GDP, which is relatively low internationally. And although the NZGB market has deepened over the past decade as outstanding debt has risen, liquidity

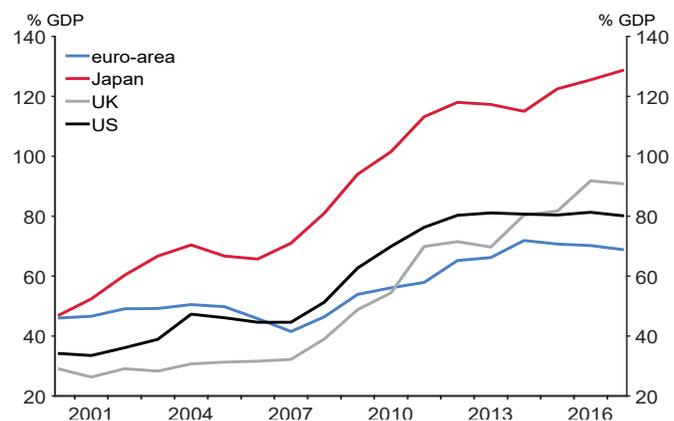
30 The variation in swap spreads reflects a number of factors, including expectations of short term bank credit risk, and the applicable term risk premium related to liquidity dynamics in each market.

Figure 8
Spread
between
New Zealand
interest swap
rates and
government
bond rates



Source: Bloomberg.

Figure 9
Central
government
debt



Source: Haver.

in the market is still considered to be relatively poor.³¹ As such, any detrimental impacts on liquidity from LSAPs will likely arise quicker, and practical constraints for the pace that the Reserve Bank could undertake

31 For further information on liquidity in New Zealand's financial markets, see Kendall (2016).

purchases may become more binding. However, during an economic downturn, outstanding government debt would probably increase as tax revenues fall and transfer payments increase, as was the case in many countries during the global financial crisis (figure 9). This would ease the liquidity constraints on LSAPs.

Apart from NZGBs, the options for bond purchases in New Zealand are relatively limited. With most firms raising finance through the banking sector, New Zealand's debt markets are relatively small. Outstanding issuance of other debt securities is relatively low, and all suffer from a lack of secondary market trading and liquidity, which would make it difficult to undertake large-scale purchases.³² Developments in New Zealand's capital markets that increased the range or market size of debt securities might change this assessment.

Purchasing foreign assets

If the supply of New Zealand assets available to be purchased is limited, the Reserve Bank could instead purchase of high quality government securities of other countries. This would have the effect of selling New Zealand dollars to purchase the foreign assets, increasing the supply of New Zealand dollars, and allowing the monetary base to expand. In theory, a faster rate of growth in the monetary base relative to other countries could be expected to put downward pressure on the New Zealand dollar³³. This depreciation would raise traded goods inflation, and improve the competitiveness of exporters.

32 As reported in Hunt et al (2015), total private-sector domestic debt securities (that is, excluding government and local government) for high-income countries averaged 33 percent of GDP in 2010, whereas the equivalent figure for New Zealand was around 20 percent of GDP

33 For a full discussion of the monetary theory of exchange rates, see Copeland (2014).

Purchasing foreign assets has been proposed as an unconventional policy option for both the European Central Bank and the Bank of Japan. The former has legal constraints on the purchase of government securities within the euro area; while the latter, due to the extent of its purchases of the Japanese government bonds, has created liquidity issues in Japanese bond markets.

The effects of expanding the money supply on exchange rates have, in practice, been variable. A recent example was the Swiss National Bank, which between 2007 and 2015 increased foreign reserves by more than 500 billion Swiss francs, purchasing foreign currency assets to limit the appreciation of the franc, and expanding the monetary base by almost 400 billion Swiss francs.³⁴ However this policy proved ineffective against the extent of the ECB's quantitative easing programme and a weakening euro, and was abandoned in January 2015.

If New Zealand considered purchasing foreign assets as interest rates reached the effective lower bound, it would probably be in an environment of very low global rates. Other countries may also be expanding their monetary bases by undertaking large quantitative easing programmes. Therefore the net effect on the New Zealand dollar exchange rate will depend on the relative size of these programmes.

Interest rate swaps

In New Zealand, there is the possibility of using the interest rate swap market to influence broader interest rates. New Zealand's interest rate swaps market is relatively large and liquid compared to the bond markets, meaning there may not be the same constraints on liquidity

that purchases of NZGBs may face³⁵. The interest rate swaps curve (exchanging fixed interest and floating rate payments) is the main benchmark curve for banks' funding costs, and borrowing costs for corporates. This contrasts with some other advanced economies, such as the United States, where the government bond curve is an important benchmark for the pricing of other financial instruments.

Purchasing interest rate swaps could be a way to signal that the Reserve Bank expects to keep the OCR low for a prolonged period. Swap rates comprise the expectations of future policy rates, the term risk premium, and margin for bank credit risk.

For any contract, the financial losses incurred by the Reserve Bank would be proportional to the difference between the actual path of the OCR and the market expectation when the contract was agreed. There should also be an element of portfolio rebalancing, helping to lower yields on alternative assets. Buying interest rate swaps from banks would oblige them to buy or create longer-duration assets (for example, government or corporate bonds or fixed-term loans) to keep their balance sheets hedged to interest rate risks.

Using interest swaps does not involve the exchange of principal in the way that outright asset purchases do. Consequently, buying swaps has a smaller effect on the amount of cash in the banking system and the Reserve Bank's balance sheet, although it does not reduce the amount of interest rate risk that the Reserve Bank would be taking on its balance sheet.

34 See Swiss National Bank web site.

35 As at the end of 2016 the face value of government bonds issued in the secondary market was \$74,828 million. By comparison the notional value of interest rate swaps reported by the four largest banks, as published in their Annual Reports for 2016, was \$1,882,610 million, with a fair value of \$29,116 million.

Targeted term lending

Targeted term lending for banks can be effective for economies that rely heavily on bank financing, as discussed in section 2. This is the case in New Zealand, with 85 percent of credit to the non-financial sector in New Zealand facilitated through the banking sector. Some form of targeted lending scheme could be particularly useful if banks' funding costs were elevated or if credit supply to particular sectors was impaired, and the benefit of the low OCR was not being passed through to the real economy.

This type of facility would provide collateralised term lending to banks at a subsidised rate if banks met specified lending objectives. These criteria would ensure that the low policy rate was being passed on to households and businesses. Holding collateral against the loans would mitigate the risks to the Reserve Bank's balance sheet. Since a targeted lending scheme could see banks taking on more credit risk than they might otherwise choose, it would need to be carefully managed

Implementation considerations with unconventional policies

The Reserve Bank Act does not constrain the Reserve Bank in implementing unconventional monetary policies, but unconventional policies raise new issues and risks. It is important to ensure that there is a common understanding of the costs and benefits of these policies, including how these may evolve over time, before they are introduced. As discussed, unconventional policies create risks to market functioning, the central bank and consolidated crown balance sheet, and to financial stability.

With regard to market functioning, the Reserve Bank may need to reconsider the parameters of the various market liquidity facilities it operates, especially if the demand for such facilities were to increase as a result of impaired market liquidity. If the Reserve Bank began an asset purchase programme of NZGBs, it would be beneficial to coordinate activities with the New Zealand Debt Management Office. For example, it may be undesirable for purchases in the secondary market to take place on the same day as any primary issuance because of the potential effect on pricing.³⁶ It would be important that market participants, including potential foreign buyers of New Zealand government securities, understand the expected size, scope and time frame of the asset purchase programme.

With regard to the Reserve Bank's balance sheet, consideration would need to be given to the appropriate equity required were the balance sheet to expand as a result of asset purchases.

To maintain its equity buffer, the Reserve Bank could seek an injection of capital from the government or an indemnity. Outside of that, it may be prudent to retain profits where possible, as discussed in Archer and Moser-Boehm (2013). In the case of LSAPs, net interest income could be retained to build up an equity buffer to absorb the potential for unexpected losses in the latter part of the programme.

The Reserve Bank has a range of tools to address any financial stability risks that might arise from an extended period of very low interest rates. How these tools are used would depend on the precise nature of the economic shock.

³⁶ Currently, the Bank only deals in the secondary market to buy back soon-to-mature bonds on behalf of the NZDMO. Purchases for the Bank's investment portfolio are facilitated directly through the NZDMO at the syndicated or tendered rate.

Finally, while monetary policy has typically been the first line of defence against short-term economic instability, it may be desirable for fiscal policy to play a more active stabilisation role given the limitations on monetary policy when policy interest rates fall to zero. In this context, fiscal policy can play an important role in influencing the extent, scope, and duration of unconventional monetary policy that may be required in the aftermath of a large economic shock that pushes official interest rates towards zero. International evidence indicates that fiscal policy becomes more effective in severe downturns. And in New Zealand, fiscal policy played an important role in the response to the 2007/08 global financial crisis. This experience suggests that should the policy rate approach zero, the potential for stimulatory fiscal policy should also be considered.

4 Conclusions

New Zealand is fortunate that in wake of the 2008/2009 global financial crisis it was not required to reduce interest rates to zero, or implement unconventional monetary policies. We retain significant monetary policy space today. Nonetheless, with the OCR at historically low rates, it is appropriate that the Reserve Bank considers the issues associated with unconventional monetary policies in New Zealand, should economic conditions in the future require the OCR to be reduced to zero.

This article has discussed a range of options available to the Reserve Bank if it needed to provide further stimulus to output and inflation. These options include moving the OCR into negative territory, purchasing domestic and foreign government bonds, purchasing interest rate swaps, and providing term-lending facilities for banks. As is the case currently,

forward guidance would remain an important feature of the Reserve Bank's monetary policy strategy.

The most appropriate policy options will depend on the economic and financial context at the time. This article has discussed how some of the specific characteristics of New Zealand's financial markets – its relatively small size, undiversified structure, and high composition of overseas ownership – create limitations on the extent to which unconventional policies can be applied. Furthermore, in a small open economy such as New Zealand, the exchange rate becomes an important channel. Finally, while the policies can improve financial conditions, their effectiveness is constrained by the demand for finance in the economy at the time. It is likely that the Reserve Bank would need to consider a combination of policies, as has been the experience of other countries.

The Reserve Bank would look to communicate well in advance of any of unconventional policies being implemented, so as to enable financial markets and the government to prepare. Indeed, as this article has discussed, the policy signalling channel is one of the most important ways these policies have their effect. Nonetheless, we are rarely given the luxury of time when financial crises hit, and therefore the Reserve Bank will continue to monitor other countries experiences, and carry out further research into unconventional policy as financial markets evolve.

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