
ARTICLES

What is the repo market? Why does it matter?

Bevan Cook

The repurchase ('repo') market was a key channel through which the Global Financial Crisis was transmitted. With activity in these markets now recovering, pressure is mounting for regulators elsewhere to increase the resilience of repo markets so that they become a more stable source of funding during periods of market stress.

New Zealand's repo market has not suffered from the same kind of issues, primarily because financial institutions here do not use repos to gain leverage. Furthermore, the small size of the New Zealand repo market and the dominance of low-risk collateral have meant that it is less likely to transmit shocks to other markets. Nevertheless, the Reserve Bank continues to monitor local repo market developments carefully.

This article outlines the functioning of repo markets, as well as recent developments both offshore and in New Zealand, and touches lastly on the outlook for these markets.

1 Introduction

Repurchase agreements, or 'repos', are a form of secured borrowing and lending. In the New Zealand context, repos are predominantly used by banks for managing short-term fluctuations in their cash holdings, rather than for general balance sheet funding. However, in many offshore markets, there are entities that use repo markets to fund leveraged position-taking in securities. Some major securities firms, such as Lehman Brothers and Bear Stearns, funded a substantial portion of their balance sheets in this way.

The repo market was a key channel through which the Global Financial Crisis (GFC) was transmitted.¹ As asset prices declined during the crisis, repo lenders increased the amount of collateral required for a given level of cash lending. This meant that investors holding leveraged portfolios of securities were not able to undertake the same level of secured borrowing via repo markets as they had previously. The ensuing funding shortfall forced investors to lower their leverage by selling assets, which contributed to even lower asset valuations that fed back into further asset sales, creating a 'vicious cycle'. Stresses also appeared in repo markets backed by government securities, as exceptional demand for these safe-haven assets led to shortages.

Overseas regulators have since been seeking to increase the resilience of repo markets so that they become a more stable source of funding during periods

of market stress.² In this way, regulators hope to avoid a repeat of the events that exacerbated the crisis. More recently, the focus on repo markets has intensified, given signs of revival in some markets, which had been in steady decline since the crisis.

Activity in New Zealand's repo market has also recovered, with turnover in repos that use government securities as collateral hitting record highs in late 2011. However, New Zealand's repo market is different from those offshore because domestic banks, which are the main market participants, do not typically rely on repos for funding. The resulting low level of leverage limits the sensitivity of the market to swings in risk appetite. Furthermore, the small size of our repo market and the dominance of low-risk collateral means that it is much less likely to transmit shocks to other markets. As a result, we do not believe that the New Zealand repo market poses a systemic risk to the wider financial system. However, we will continue to monitor developments in this market.

2 Repurchase agreements

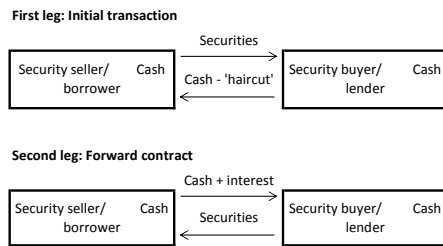
A repurchase agreement is a contract in which a *seller* of securities agrees to buy them back at a later date at a predetermined price (see figure 1, overleaf). A reverse repurchase agreement, or 'reverse repo', is a contract in which a *buyer* of securities agrees to sell them back at a later date at a predetermined price. The two agreements

¹ Gorton, G and A Metrick (2009), "Securitized banking and the run on repo", NBER Working Paper 15223.

² *Financial Stability Board* (2012), "Securities lending and repos: Market overview and Financial Stability Issues", Interim Report, 27 April 2012.

are the opposite sides of the same transaction. The buyer of the securities is the lender, while the seller of the securities is the borrower, using the securities as collateral for a loan at a fixed rate of interest.

Figure 1
Repurchase agreement structure



A key distinction between repo lending and a collateralised loan is that legal ownership of the security is transferred, providing the repo lender with stronger control over the collateral, as well as quick access to collateral if the counterparty defaults. Other key features³ of repo agreements include:

- At the termination date, when the borrower repays the lender, the repurchase price for the collateral will include an interest payment, sometimes called the repo rate. A repo that uses a mixture of non-specific government securities as collateral is known as a general collateral (GC) repo, and the repo rate in this case is known as the GC rate. The relative safety of government securities allows the GC rate to be lower than other repo rates.
- The lender is only exposed to changes in the value of collateral if the borrower defaults, because the forward contract sets the price in advance at which the lender resells the collateral. To limit this exposure, the amount of cash borrowed is typically less than the current market value of the collateral. The difference, which is known as a 'haircut', protects the lender against changes in market value of the collateral.
- Collateral substitution occurs when the borrower in a GC repo needs to reclaim a specific government bond that it has provided as collateral. The borrower

is able to replace the bond with another of equivalent value and quality (for a fee) in order to keep the repo agreement intact.

- If the market value of the collateral changes by a pre-determined amount, either party to the transaction can make a 'margin call'. This means that additional collateral is added, or existing collateral is released, to realign its total market value with the amount of the loan (plus any required haircut).

3 Participants in repo markets

Participants in the repo market include entities that wish to manage short-term fluctuations in their cash holdings on a secured basis. Idle cash is invested via reverse repos, while cash shortages are financed via repos. These transactions are typically short-term in nature, reflecting the needs of such participants.

Security holding institutions, such as fund managers, sometimes use their securities to take advantage of favourable repo rates. In the case where the repo rate on a specific security falls substantially, fund managers that own these bonds are able to borrow cash at a cost significantly lower than the prevailing market rates.

Financial institutions that are in the business of taking positions on the direction of interest rates can use repos to build up their inventory of securities through leverage. For example, if the required haircut is 2 percent, a hedge fund with \$2 in equity can finance the purchase of \$102 worth of government bonds by borrowing \$100 in a repo contract and using these same bonds as collateral for the repo. The borrower is thus able to take on a \$102 exposure that is backed by \$2 in equity – equivalent to a leverage ratio of 51 to 1. A trader who expects interest rates to fall, and thus bond prices to rise, will wish to buy bonds in this way to increase potential profits.

Reverse repos on a specific bond allow traders to take a 'short' position in that bond. A trader uses a reverse repo to borrow a bond, which they can then sell outright in the market, to finance the cash leg of the reverse repo. When the repurchase agreement matures, the trader can buy back the bond outright, hopefully at a lower price than they sold it for, and return it to the counterparty from which

³ Wakeling, D and I Wilson (2010), "The Repo Market in Australia", *Reserve Bank of Australia Bulletin*, December.

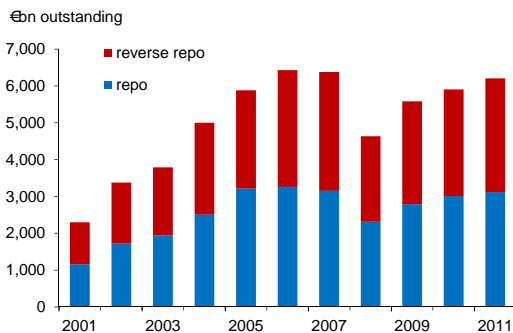
they borrowed it. Alternatively, the trader could engage in another reverse repo to stay short the bond.

In some countries, central banks are also active participants in repo markets, using repos and reverse repos for liquidity management. See section 7 for further details on the Reserve Bank's role in the New Zealand market.

4 International experience with repo markets

The repo market was the fastest growing wholesale funding market in developed economies prior to the GFC.⁴ By the end of 2007, the value of repos outstanding in the euro area was surveyed at around €3.2tn, while primary dealers in the US, which account for around 90 percent of US activity, had around US\$4.1tn in outstanding repo agreements (see figures 2 and 3). Repo agreements appealed to a broad range of investors because of the protection provided by the legal transfer of collateral to the cash lender.

Figure 2
European Union repo market size



Source: International Capital Market Association (ICMA) European Repo Market Survey

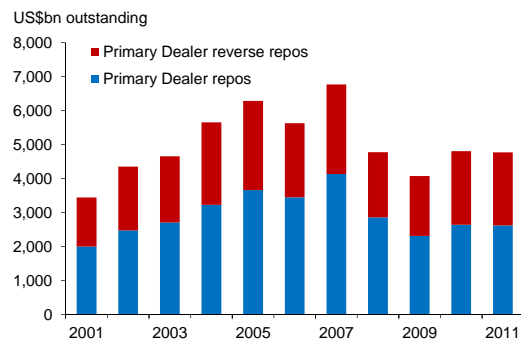
Note: ICMA surveys a sample of around 60 institutions. The data does not include the value of repos transacted with central banks.

But despite its perceived safety, repo market activity collapsed during the crisis, as the market value of collateral declined and fears over counterparty risks rapidly spread.⁵ Problems began because not all repos were conducted using low-risk government securities (see figure 4).

⁴ Hördahl, P and M King (2008), "Developments in repo markets during the financial turmoil", Bank for International Settlements *Quarterly Review*, December.

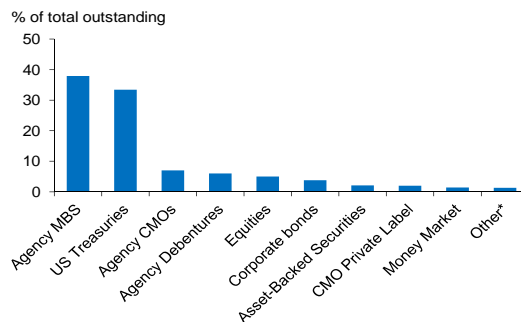
⁵ International Monetary Fund (2010), "Systemic liquidity risk: Improving the resilience of financial institutions and markets", *Global Financial Stability Report*, October 2010.

Figure 3
US repo market size



Source: Federal Reserve Bank of New York

Figure 4
US tri-party⁷ repo collateral by type (as at May 2012)



Note: Mortgage-Backed Securities (MBS), Collateralised Mortgage Obligation (CMO)

Source: Federal Reserve Bank of New York

Instead, collateral included assets whose value became increasingly uncertain as the crisis deepened. Lenders protected themselves by raising the size of haircuts on riskier forms of collateral. As a result, leveraged investors that relied on the repo market for funding found that their existing level of equity was no longer sufficient to support their trading portfolios, leading to fire sales and further falls in prices.⁶ What followed was a downward spiral of heightened volatility, rising haircuts, forced selling, and lower valuations.

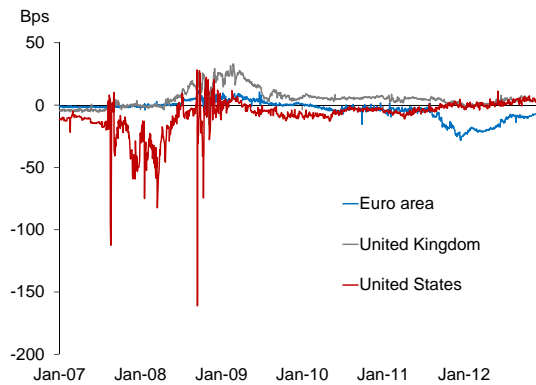
Demand for government securities soared in the ensuing flight to safety. As more and more investors chose to hold on to US government bonds, the supply of collateral for the GC repo market in the US withered and

⁶ Fitch Ratings (2012), "Repo emerges from the Shadow", Macro Credit Research, 3 February 2012.

⁷ A substantial portion of repos in the US are "tri-party repos" (around 50% in May 2012), in which a third party acts as an intermediary in the transaction.

activity in this market also contracted. The GC repo rate spiked lower relative to expectations for monetary policy (see figure 5), as cash lenders became willing to accept lower returns on loans backed by safe-haven collateral.

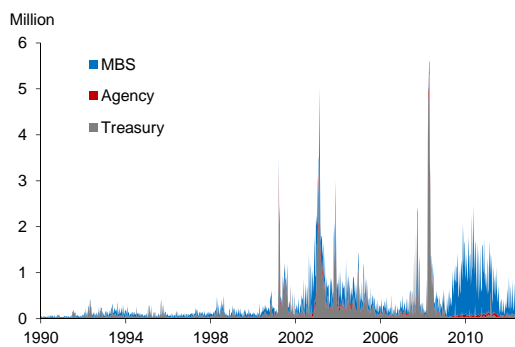
Figure 5
Three-month GC repo – OIS⁸ spreads



Source: Bloomberg

Signs of stress could also be seen in a sharp rise of ‘failed’ transactions (see figure 6), as collateral was not presented to counterparties on time. Fails can increase suddenly when delayed collateral transfers have knock-on effects to other transactions due to the tightly timed nature of repo transactions. Meanwhile, persistent fails are more likely to occur when there is a low (or negative) cost of failing because repo rates are close to (or below) short-term interest rates.⁹ The negative impact that persistent fails can have on market liquidity and stability prompted the industry body in the US to introduce penalties for late settlement.

Figure 6
Transaction failures in the US



Source: Federal Reserve Bank of New York

⁸ Overnight Indexed Swap (OIS) rates are benchmark interest rates that provide a useful gauge of monetary policy expectations.

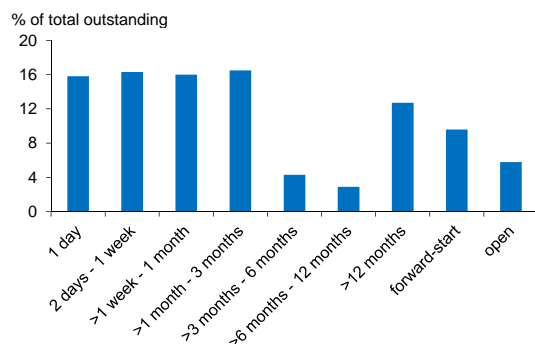
⁹ Treasury Market Practices Group, “Understanding settlement fails in agency mortgage-backed securities”, 29 April 2011.

The collapse of the repo market contributed to a liquidity shock that had far-reaching consequences for the global financial system. The impact was transmitted to other markets as an increasing number of institutions, which were dependent on repo funding, were forced to sell assets.¹⁰ The deterioration in market conditions that followed was extremely rapid, reflecting the short tenor of repo lending (see figure 7) and the high leverage of some non-bank financial institutions.

5 How does the New Zealand repo market differ from that offshore?

New Zealand’s repo market is less developed than those in most other Western economies. The primary participants are retail banks and the Reserve Bank, both of which use repo for short-term liquidity management. Unlike in some of the more developed offshore markets, there are no financial institutions specialising in using repo markets to take leveraged positions on the underlying securities. Two factors contributing to this absence are the limited pools of domestic savings and the lack of liquid securities markets.

Figure 7
European repos by maturity (Dec 2011)



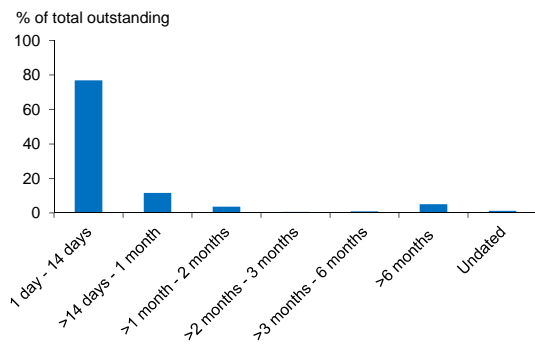
Source: International Capital market Association (ICMA) European Repo Market Survey

The most notable implication of these factors is that a repo market exists only for government securities in New Zealand. Because this market is mostly used for short-term liquidity management, repos are also predominantly

¹⁰ Mehrling, P (2011), “The new Lombard Street: How the Fed became the dealer of last resort”.

short term, with most having an original maturity of less than 14 days (see figure 8). Participants do not generally require haircuts on their cash lending because the short tenor of these transactions limits the exposure to changes in collateral value. The Reserve Bank is the main exception, requiring haircuts of 2 to 3 percent on its Open Market Operations (see section 7 for further details).

Figure 8
New Zealand repos by maturity



Note: Locally incorporated banks only, 18 month average to Oct 2012
Source: Reserve Bank of New Zealand, NZ Clear

Prudential supervision by the Reserve Bank limits the degree to which retail banks can undertake leveraged position-taking in the repo market. In particular, the Bank's prudential liquidity policy limits their reliance on short-term wholesale funding.¹¹ This policy additionally strengthens banks against future periods of funding stress by requiring them to hold adequate levels of 'liquid' assets, such as government securities, that can be readily sold or repoed regardless of market conditions.

The key point here is that a disruption in the New Zealand repo market is far less likely to spill over into other asset markets. This is because the lack of leveraged position-taking, the dominance of low-risk collateral, and established regulatory oversight of the main market participants should reduce the scope for pro-cyclicality.

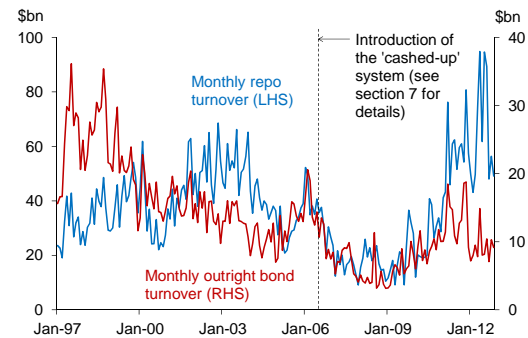
¹¹ Hoskin, K, I Nield and J Richardson (2009), "The Reserve Bank's new liquidity policy for banks", Reserve Bank of New Zealand *Bulletin*, Volume 72 (4).

¹² The Government Bond Turnover Survey is sourced from NZClear and relies on market participants to accurately enter details of their transactions. The bond turnover statistics were revised by the Bank on 3 September 2012, after an internal audit of the data identified systematic under-reporting of specific trades.

6 Developments in New Zealand repo markets

Activity in the New Zealand repo market has recovered over the past few years, with repo turnover hitting new record highs in late 2011 and again in early 2012 (see figure 9). The Government Bond Turnover Survey¹² indicates that repo turnover reached \$80bn per month during this period, from lows of around \$20bn in 2009. Figure 10 also shows that turnover in the market for outright purchases and sales of government bonds has picked up, although to a lesser extent.

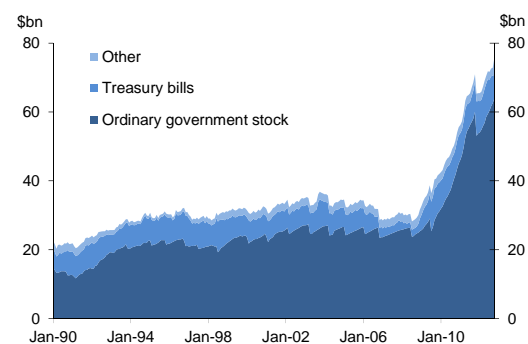
Figure 9
Government bond turnover survey



Source: Reserve Bank of New Zealand

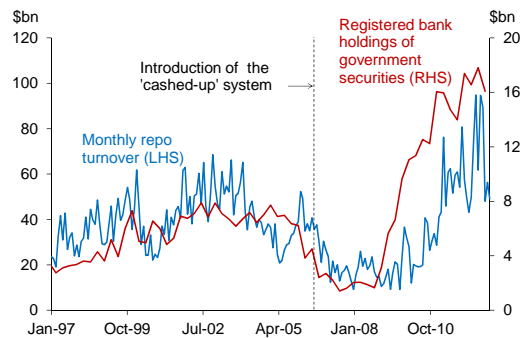
An increase in government securities issuance (see figure 10) was a key driver of the recovery in both repo and outright bond markets. In terms of repo markets, an increase of government securities on issue raises the amount of eligible collateral in circulation, thereby encouraging banks to use those markets. Indeed, as registered banks' ownership of government securities has increased, repo turnover has picked up (see figure 11, overleaf).

Figure 10
Total government securities on issue



Source: Reserve Bank of New Zealand

Figure 11
Registered banks' holdings of government securities

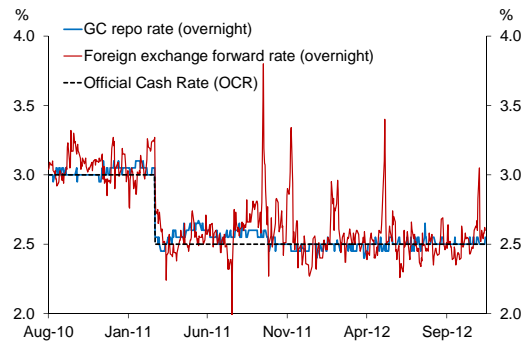


Source: Reserve Bank of New Zealand

This recovery in the markets follows a period from 2004 to 2008 when there was a decline in net new issuance of government securities, as the government consistently ran budget surpluses. Over this period, liquidity in the repo market dropped and the frequency of settlements fails increased. These collateral shortages helped provide an impetus for the Reserve Bank to change the way the payment system was liquefied (see section 7 for details).

Offshore holders of New Zealand government bonds wishing to increase their holdings may use the repo market to fund the purchase, or can alternatively enter the foreign exchange market to access New Zealand dollars directly. Offshore investors that do not rely on leverage tend to switch between these markets depending on which offers the cheaper rate. The cost of raising New Zealand dollars through foreign exchange markets spiked a number of times between October 2011 and November 2012 (see figure 12). The wider spread between the repo and foreign exchange forward rates is another factor that has contributed to the periodic surges in repo activity during these periods, along with elevated appetite for New Zealand government bonds among offshore investors.

Figure 12
Overnight interest rates



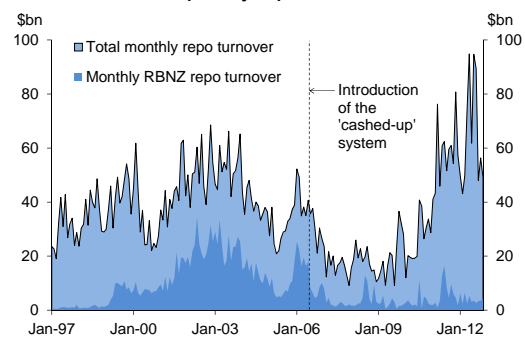
Note: The foreign exchange forward rate is typically more volatile than the GC repo rate because foreign exchange forwards are influenced by offshore developments, as well as domestic ones.

Source: Reserve Bank of New Zealand.

7 Reserve Bank participation in NZ repo markets

The Reserve Bank is a major participant in the repo market and has, at times, contributed substantially to total market turnover (see figure 13). The bulk of Reserve Bank activity is due to its liquidity management operations, although the Bank also offers a Bond Lending Facility and an Overnight Reverse Repurchase Facility (discussed below).

Figure 13
Reserve Bank liquidity operations



Source: Reserve Bank of New Zealand

Reserve Bank liquidity management operations are aimed at maintaining the overnight rate close to the OCR by avoiding large swings in the volume of cash in the system. Changes in system liquidity are typically driven by the timing of government activities, such as tax receipts or government disbursements. One way the Bank can offset these flows is by conducting Open Market Operations (OMOs). In these OMOs, the Bank uses repurchase

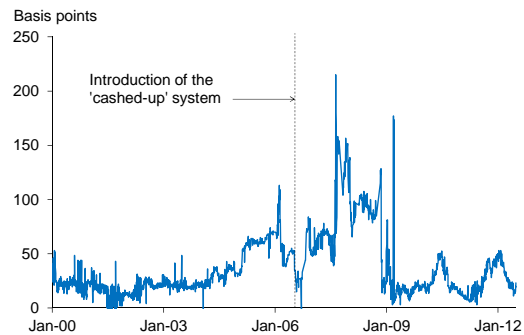
agreements to withdraw cash from the banking system by selling securities from its holdings in exchange for cash. Conversely, a reverse repo is used to inject cash into the banking system by purchasing repo-eligible securities.

The Bank was very active in this market before 2004 because it used OMOs as its primary tool for liquidity management.

During the early part of the last decade, persistent government budget surpluses introduced significant challenges for managing system liquidity because it resulted in large amounts of cash leaving the banking system. These flows, which were effectively a drain on liquidity, were offset by increased Reserve Bank injections. At the same time, it became increasingly difficult to inject large amounts of cash due to collateral shortages as the Government reduced its issuance of securities. As a result, the Bank began increasingly to use foreign exchange swaps for its liquidity smoothing operations.

Pressures were also seen in the payment system. From 1998, when the Real Time Gross Settlement (RTGS) system was introduced until 2006, banks used the Reserve Bank's automated repurchase facility called Autorepo to obtain intra-day liquidity.¹³ Repo transactions within Autorepo predominantly used government securities as collateral, with limited quantities of private sector securities. However, the diminishing supply of new government securities became a constraint on the payment system. This was reflected in a widening spread between the bank bill and Treasury bill rates (see figure 14). Another indicator of market stress was the increasing number of failures of tightly timed back-to-back settlements of securities, in which an initial failure caused a chain of subsequent fails.

Figure 14
Three-month bank bill versus Treasury bill spread



Source: Bloomberg

As a result of these issues the Reserve Bank introduced a 'cached-up' payment system between July and October 2006. Trading banks were able to hold a lower volume of repo-eligible securities, with the subsequent decline in demand for Treasury bills causing the bank bill-Treasury bill spread to tighten back to more 'normal' levels, at least until the onset of the GFC. Among other things, the new system meant the Bank had to rely almost entirely on foreign exchange swaps to manage fluctuations in system liquidity.

The Reserve Bank opened its Bond Lending Facility in July 2005. Banks can use this facility to borrow specific government bonds using reverse repo agreements. It was introduced in response to evidence of uncooperative behaviour in the market, as the supply of bonds declined in the early 2000s.

During this period some bondholders were able to buy enough of a specific bond to gain control of the repo rate for that bond, in effect cornering the market. Participants urgently requiring such a bond could be forced to accept a lower rate of return on cash lent in exchange for the bond, allowing the bondholder to borrow cash using repos at a cost significantly below the prevailing market rate. In addition, to retain control of the rate, the bondholder would repo out some of these bonds to the Reserve Bank for cash. This would effectively remove the bond from the market, keeping the repo rate suppressed.

The aim of the Bond Lending Facility is thus to prevent a shortage in a particular bond and the subsequent settlement failures that can occur. The Reserve Bank also introduced limits on the amount of a particular security it

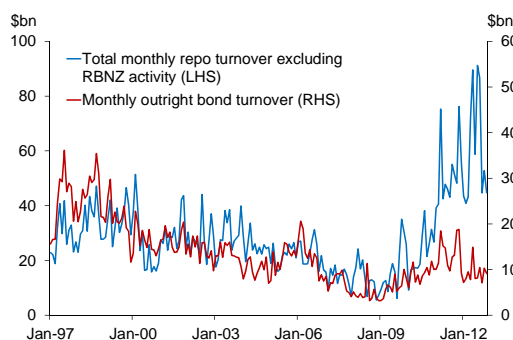
¹³ Nield, I (2006), "Changes to the liquidity management regime", Reserve Bank of New Zealand *Bulletin*, Volume 69 (4). Note that repos in the Autorepo facility were only included in the repo activity figures only before 2002.

would accept as collateral for the purpose of repo lending, to reduce the scope for a bondholder to keep a bond out of the market.

The Reserve Bank's Overnight Reverse Repurchase Facility (ORRF) allows approved market participants to access cash on demand. The aim of this facility is to cap the cost of raising cash at the ORRF rate of 50bp above the OCR. If the cost of borrowing overnight cash in the market is higher than this, it will be cheaper for participants to use the ORRF.

Figure 15 shows repo and outright turnover in government bonds with Reserve Bank activity stripped out of the aggregate figures. Compared to figure 9, this shows a tighter association between turnover in the repo and outright bond markets. However, the recovery in outright bond turnover since mid-2010 still does not match the gains in repo turnover. One reason for this could be that the Reserve Bank's liquidity policy, which took effect from April 2010, has had a dampening effect on outright sales but not on repos. The policy requires banks to retain a higher volume of government bonds on their balance sheets.

Figure 15
Government bond turnover excluding Reserve Bank repo activity



Source: Reserve Bank of New Zealand

8 The outlook for the repo market

Globally, repo markets have shown signs of revival, after a period of steady decline following the crisis. Heightened concerns around counterparty risk will continue to support repo market activity due to the lower credit risks associated with collateralised lending.

However, strong precautionary demand for high-grade assets and the less orthodox approach of major central banks in adding vast quantities of government debt to their balance sheets is locking up large volumes of high-grade assets. The reduction in available collateral may not only dampen activity in repo markets, it could also impede the process of credit creation, resulting in a significant tightening of money supply. This is because financial institutions often re-use collateral that their counterparties have posted with them, to support their own deals. An asset used as collateral can be churned (rehypothecated) several times. For this reason, any reduction in collateral may have a disproportionate impact on credit.

Changes are likely in the global regulatory framework. Regulators in Europe and the US now see the repo market as systemically important. They want to find ways to ensure that secured short-term funding markets will remain open, regardless of market conditions. For instance, the Federal Reserve Bank of New York has pushed for the creation of an independent clearing house to act as a back-stop to repo markets. This could help avoid transaction failures that can exacerbate fears during periods of stress, and could also improve market transparency by making centrally collected data available. Other suggestions include regulatory minimum standards on the quality of collateral used, and officially-set minimum haircuts.

In New Zealand, repo market activity is likely to remain firm in the near term. Repo market turnover will be supported by further growth in eligible collateral as the net issuance of new government bonds continues. In addition, banks are likely to continue relying more heavily on secured markets for liquidity management, given that their holdings of government securities have risen in accordance with the Reserve Bank's liquidity policy.

The New Zealand Financial Markets Association has approached the NZDMO and Reserve Bank about how they could help develop the market for longer-term repos. The Bank is currently considering how it might be able to assist with this, given that the development of a term repo facility would be consistent with the Bank's aim to support the development of New Zealand capital markets.

9 Summary and conclusions

Repo markets in New Zealand play an important role in enabling the banks to manage short-term fluctuations in their cash positions. Repo markets in New Zealand and overseas have recovered over the past few years. Offshore markets were a key channel through which the global funding crisis was transmitted. However, New Zealand repo markets largely avoided the problems that amplified the scale of the economic downturn. A number of factors reduce the scope for pro-cyclicality in New Zealand repo markets. These include:

- a low level of leveraged position taking
- a very high proportion of low-risk collateral
- established regulatory oversight of key participants

As a result, we do not believe the New Zealand repo market poses a systemic risk to the wider financial system. However, we will continue to monitor developments in this market.

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