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How the Reserve Bank of New Zealand manages liquidity for monetary policy implementation

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This article provides an overview of how the Reserve Bank (the Bank) conducts liquidity management to implement monetary policy. It explains how the Bank manages the level of liquidity in the banking system to ensure short-term interest rates trade close to the Official Cash Rate (OCR). It also describes the two areas of liquidity management conducted by the Bank: what the Bank does to maintain a stable and sufficient supply of system liquidity (including the challenges we face); and how the Bank ensures that individual banks have access to liquidity to meet daily transactional obligations through the payments and settlement system.

1 Introduction

The implementation of monetary policy is an important part of a central bank's role in the economy. The Reserve Bank of New Zealand (the Bank) has a number of responsibilities which include the implementation of monetary policy, the operation of the inter-bank payments and settlements system, and the promotion of a sound and efficient banking system.

The Domestic Markets team is responsible for the implementation of monetary policy. The team's primary responsibility is to ensure short-term interest rates trade close to the Official Cash Rate (OCR) set by the Reserve Bank Governor. The team is also responsible for the management of liquidity in the banking system to ensure that the payments and settlements system functions in a sound and efficient manner. The team uses various liquidity tools (such as open market operations) to achieve these goals. The Domestic Markets team is also responsible for monitoring domestic interest rate markets and gathering market intelligence on behalf of the Bank. The team has members based in both Wellington and Auckland with operational responsibilities shared across both sites daily. Additionally, the Auckland office provides a

1 The author would like to thank John Groom, Dean Hill, Mark Perry, Bob Xia, and Chris Kim for their helpful comments and assistance.

business continuity function in cases where the Bank's Wellington office is closed.

This article discusses the key features of the Bank's liquidity management functions and how they relate to the Bank's monetary policy and banking system responsibilities. The article also discusses how the Bank manages risks, and how it responds to issues such as the current lack of liquidity in markets.

2 Liquidity

Liquidity is one of the essential requirements for the effective functioning of the banking system. Without adequate liquidity, banks are not able to perform some of their core functions, including the settlement of inter-bank obligations (wholesale transactions occurring between banks). Excessive or insufficient liquidity in the financial market also has the potential to undermine the implementation of monetary policy by tightening or loosening interest rates in ways that may contradict current and intended monetary policy settings. Too much liquidity in the banking system on a regular basis fosters an expectation of falling interest rates; too little liquidity increases the expectation of higher interest rates. Maintaining smooth cash flows and reducing short-term interest rate volatility produces a stable environment where businesses and individuals can make more informed decisions when borrowing and lending money. Effective management of liquidity in the banking system is therefore an important element in maintaining a well-functioning banking system and implementing monetary policy.

The Government banks with the Reserve Bank and therefore its transactions affect the level of liquidity in the banking system. As a result the Bank has to manage the liquidity associated with government transactions; we inject liquidity to compensate for net payments from the banking system to the government (e.g. tax payments) on any given day, and we withdraw liquidity to compensate for net payments from the government to the banking system (e.g. pension payments). These liquidity transactions are conducted by the Domestic Markets team via open market operations (OMOs), via the Reserve Bank Bill (RB Bill) tender programme or directly in the market via FX swaps. In performing this role, the Bank works closely with the New Zealand Debt Management Office (NZDMO). The Bank has a close relationship with the NZDMO, which greatly assists with the main elements of the Bank's liquidity management functions in respect of neutralising the liquidity effects of government transactions. The relationship between the Bank and NZDMO is detailed in box 1.

In addition to these functions, the Bank's liquidity management plays an important role in informing the Bank of developments in the financial markets and banking system, thereby better equipping the Bank to identify and respond to potential stresses. Participating in market transactions (e.g. OMOs, RB Bill tenders and foreign exchange swaps) allows the Bank to gain knowledge and insight about interest rate movements and the availability, or not, of liquidity and various securities.

Box 1

The Bank:

- Provides NZDMO with a Crown Settlement Account (CSA).
- Receives from NZDMO a schedule of actual and forecast cash flows (payments and receipts) related to financial operations. A forecast of payments is received from the larger government departments.
- Conducts operations when necessary. The Bank reviews and verifies known cash flows between the government, the Bank, and banking system. The Bank decides if it wants to offset these flows and if it does the Bank either injects cash into, or withdraws cash from, the banking system to help maintain a broadly stable level of liquidity.
- Repurchases government bonds. These repurchase transactions normally occur within six to 12 months of the bond maturing. The Bank will repurchase the bond and pay the cash to the bond holder. The Bank might then either hold the bond on its balance sheet until maturity or sell the bonds to NZDMO for cancellation.
- Provides market support by producing and publishing a variety of surveys and schedules: these include the weekly survey of the turnover of government bonds in the secondary market and the monthly survey of non-resident holdings of government bonds, treasury bills and other securities.

3 The settlement cash level

The level of settlement cash is a key element of New Zealand's banking system. It is the primary tool which allows the Bank to manage liquidity. Settlement cash can be defined as the aggregate amount of surplus cash held by all Exchange Settlement Account System (ESAS) holders at the end of any given banking day. The Bank can use settlement cash to influence short-term interest rates such that they align with the Bank's monetary policy stance. Settlement cash can also be used to ensure there is adequate liquidity in the banking system in times of financial crisis or stress.[2]

Influencing Liquidity

The level of settlement cash can be influenced only by the government, via its CSA account, and the Bank itself. No other entity can influence the level of settlement cash.

Liquidity in the banking system is greatly affected by flows between the government or the Bank and the banking system.[3] When the government makes disbursements to the private sector (e.g. in the form of social welfare payments, tax refunds, or salaries to public servants) and this exceeds the cash it receives from the private sector (e.g. in the form of tax payments or fees for government services) on any given day, this

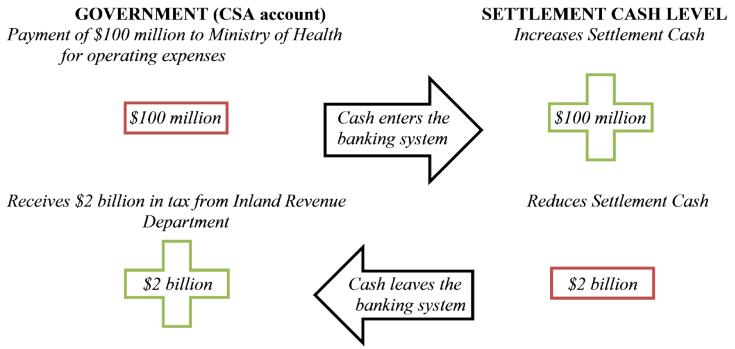
2 The Bank decided to supply a higher level of cash to the banking system in June 2006. This higher level of cash was expected to enable participants to efficiently settle day-to-day gross payments obligations. Also, the higher level of settlement cash was intended to aid demand for liquid assets, especially during times of extreme market events.

3 Transactions between the Government and the Bank do not affect the level of settlement cash.

results in an increase of liquidity in the banking system.[4] Conversely, liquidity is reduced when the government receives more cash from the private sector than it distributes.

A hypothetical example of this can be found in figure 1.

Figure 1 Cash flows and the settlement cash level



These fluctuations in liquidity could affect short-term interest rates and monetary conditions unless neutralised by the Bank.

The Bank will generally conduct liquidity operations to ensure these positive and negative cash flows are neutralised so that there is little or no impact on short-term interest rates. The Bank has the discretion to allow the flow to remain in the banking system if the flow suits in the management of short-term interest rate objectives.

Forecasting liquidity

To effectively manage liquidity, the Bank needs to know the value of any payments to and from the Government on any given day. The Bank is also concerned with payments made or received by The Bank (e.g. maturities of previous operations). The Bank does this by forecasting liquidity based on information provided to it by the NZDMO and the larger government departments (such as Ministry of Social Development, Ministry of Health and Ministry of Education). The Bank builds liquidity forecasts a year at a time with the information the NZDMO and government departments provide.[5] The Bank also uses historical patterns from previous years' forecasts to aid the current forecast. The larger government departments typically have regular payments that are relatively easy to forecast but can fluctuate for various reasons. This forecast is then refined on an on-going basis using periodic (daily, weekly and monthly) forecasts provided by the NZDMO and government departments. The regularity of these payment dates helps to provide greater certainty for liquidity forecasts, thereby facilitating effective liquidity management. The flows between the government and the Bank, including flows between the NZDMO and the Bank, do not affect the banking system regardless of the size of the payment. Total government revenue and expenditure on any given day averages about $400 million. Other large periodic government flows include maturing government securities such as treasury bills (typically about $300 million) and bonds (typically about $10,000 million).

The NZDMO assists the Bank by ensuring that the government departments responsible for about 95 percent of the government's receipts and payments provide the Bank with forecasts of their transactions in a timely manner. The Bank's responsibility is to review both the accuracy of the timing of these flows and then calculate the net impact on the banking system. Consequently, the Bank maintains a close dialogue with the larger government departments to maintain a reasonably accurate and complete understanding of the magnitude and

4 The Government receives revenue through tax receipts from IRD, and excise and duties through the Customs Department.

5 Forecasts are built from 1 July to 30 June each year and refined daily.

timing of cash flows. The NZDMO is also required to inform the Bank of transactions it has instigated that will impact on the banking system. Once the settlement cash balance and net cash influence is calculated, the Bank conducts an OMO or transacts FX swaps to counter the effect of the daily cash flows. The same forecasts will be used to determine the maturity date of these operations.

Despite periodic provisioning of cash flows forecasts by government departments, determining the settlement cash balance is not an exact science. The Bank often sees actual cash flows deviate from their forecasts, which may result in the level of settlement cash deviating from the Bank's desired level. Such unforeseen deviations can occur for many reasons, such as the forecast cash flow not occurring, or the cash flow being smaller or larger than expected. That said, the frequency of large forecasts deviations are low. Where settlement cash deviates from the Bank's desired level, the Bank will conduct the following day's OMO, an attempt to return settlement cash to the desired level.

Determining the appropriate level

The Bank has discretion to determine the appropriate level of settlement cash on any given day. The purpose of determining an appropriate level of settlement cash is to ensure an adequate level of liquidity is in the banking system at any given time. The Bank considers a number of key market indicators to determine the appropriate level of settlement cash. Once the Bank has identified the appropriate settlement cash level, it can conduct OMOs and utilise its operational tools accordingly. A description of these indicators can be found in box 2. The Bank attempts to keep the level of settlement cash stable in order to reduce volatility. If it does adjust the level, it tends to do it gradually (e.g. by $250 million); if a larger move was required then this may occur over a number of days.

Box 2

Determining the appropriate level of settlement cash

The Reserve Bank utilises several market indicators to determine the appropriate level of settlement cash. These include:

- The levels at which short-term interest rates trade. The Reserve Bank closely monitors market interest rates in the FX swap and overnight cash markets. These rates are compared to the market's expectation of the OCR over the corresponding period (using the overnight index swap rate – OIS). If the indicators are trading significantly above the market's expectation of the OCR, this signals that there may not be enough liquidity in the banking system. Conversely, there will be too much liquidity if the indicators are trading significantly below the market's expectation of the OCR.

- Frequency of use of the Reserve Bank's Overnight Reverse Repurchase Facility (ORRF – see section IV for more detail). This facility helps to keep interest rates at appropriate levels. If the ORRF is used more frequently, it may indicate that there is not a sufficient amount of settlement cash in the banking system.

Exchange Settlement Account System (ESAS)

ESAS accounts are current accounts held by market participants. These generally consist of financial institutions or financial market infrastructure. They have no overdraft facility and therefore their balance cannot fall below zero.

If an ESAS account holder needs to make a payment and has insufficient cash in their account, they must acquire the cash. They can obtain cash from other banks in the interbank market, obtain cash in the Bank's operations, if offered, or they may sell securities to the Bank for cash using the Overnight Reverse Repurchase facility (ORRF), if they have signed the Global Master Repurchase Agreement (see box 3 for more details on this agreement).[6] Use of the ORRF is charged at 50 basis points above the OCR. This rate forms the upper bound of the OCR corridor.[7] If an ESAS account holder does not have such an agreement in place with the Bank, then they will have to acquire cash from another source (e.g. other banks).

Transactions between ESAS account holders do not affect the settlement cash balance. ESAS balances are subject to change during the day as an account holder's obligations become due. Box 4 explains how banks use settlement cash.

Credit tiers

To ensure adequate distribution of cash in the banking system, the Bank allocates each ESAS account holder a credit tier. These credit tiers reflect the amount of cash an ESAS account holder can have in their account at any point in time without incurring an interest rate penalty. The Bank pays an overnight interest rate of OCR for any cash held in the ESAS accounts at the Bank.[8] Balances held in excess of an ESAS account holder's credit tier are remunerated at the OCR less 100 basis points.[9] By imposing a penalty rate, the Bank aims to encourage inter-bank trading by ESAS account holders with excess balances and prevent hoarding of cash balances.

In determining each ESAS account holder's tier, the Bank looks at the size of their payment flows, the amount of liquid assets they are required to hold and some other payments and balance sheet metrics. The Bank reviews ESAS credit tiers twice annually. The credit tiers are allocated at the Bank's discretion and a number of factors are taken into account before tiers are allocated or adjusted. A credit tier can be increased or decreased during a review. Credit tiers can also be reviewed upon request.

Box 3

Repurchase agreement

The ICMA/SIFMA 2011 Global Master Repurchase Agreement (GMRA) sets out the terms and conditions under which counterparties may obtain cash from the Bank for overnight periods or longer. Specified securities are sold to the Bank and the same security is repurchased by the counterparty at a specific future date and interest rate. Some of the core features covered by the agreement outline the legal nature of repurchase transactions, how to initiate and confirm a transaction, how cash and securities are exchanged, how to substitute securities, and the netting of exposures, payment of margins and balances in the event of a default.

6 Details of the ORRF can be found in the standing facilities section below.

7 Theoretically, this means that if an ESAS account holder requires cash, they should not pay more than OCR + 50 basis points to source cash from the market.

8 This rate forms the lower bound of the OCR corridor.

9 In June 2006 the Bank announced an increase in the deposit rate for ESAS account holders to reflect the new cashed-up banking system. The deposit rate was increased from OCR – 20 basis points to OCR on all balances within credit tiers.

Box 4

Uses for settlement cash

Banks use settlement cash to:

- Settle obligations with the government. For example, a Bank of New Zealand customer uses internet banking to make an online tax payment to Inland Revenue Department (IRD). IRD then transfers the funds to its account held at Westpac Government Branch. During the business day, if the net balance of all government departments in the Westpac Government Branch is a credit balance, this cash is transferred to the Government's account at the Reserve Bank. If the net balance is an overdraft, then cash is transferred from the Government's account at the Reserve Bank to Westpac Government Branch.

- Settle obligations with the Reserve Bank (e.g. purchasing physical currency – notes and coins – from the Bank or settling liquidity management operations they have transacted).

- Settle obligations amongst themselves (e.g. a Westpac customer pays for goods or services from a Bank of New Zealand customer).

4 The Bank's liquidity management tools

The Bank has several liquidity management tools that it can employ in order to achieve its monetary policy implementation and/or liquidity goals. These tools can be grouped into two categories – discretionary and non-discretionary. All discretionary and non-discretionary operations are conducted by the Domestic Markets team.

Liquidity operations

The characteristics of these tools are such that they will only be utilised by the Bank when it deems the use suitable. For example, the Bank will only offer to withdraw cash via an OMO, when the Bank, based on its assessment of the market and where short-term interest rates trade relative to the OCR, believes that too much cash is in the banking system.

Open market operations (OMO)

The OMO is a key tool used by The Bank to manage flows between the government and the banking system. The OMO can be used to inject cash into, or withdraw cash from, the banking system.[10] The Bank can offer to repurchase (repo) or reverse repurchase (reverse repo) transactions in the OMO depending on the system's liquidity position on the given day. Normally, if there is too little cash in the banking system (due to large tax revenue flows for example) it is likely that short-term interest rates will trade above the OCR, undermining the Bank's policy

10 In September 2000, the Bank began offering to repo portions of its holdings of New Zealand Government Bonds, as a mechanism to withdraw short-term liquidity from the banking system in its daily liquidity management operations. Prior to this the Bank issued Reserve Bank bills when it looked to withdraw cash from the banking system.

rate, and the efficient functioning of the payment and settlement systems could also be compromised. In such instances the Bank will look to inject cash into the banking system. This can be done by offering a reverse repo in the OMO. Similarly, if too much cash is in the banking system, then it is likely that short-term interest rates will trade below the OCR. In such cases the Bank can offer a repo in the OMO to withdraw the excess cash in the banking system. The Bank can sell Reserve Bank bills alongside a repo transaction in the OMO. The characteristics of Reserve Bank bills can be found later in this section. The Bank can also use foreign exchange swaps to inject or withdraw cash from the banking system, although these transactions are done outside the OMO. Box 10 explains a foreign exchange swap.

OMOs are conducted by the Bank at 9.30 am on New Zealand working days. The market is notified of the Bank's intentions at the same time through Thomson Reuters and Bloomberg.[11] Where the Bank does not need to inject or withdraw cash, it notifies the market that no OMO will be offered at 9.30 am on the day. The duration of an OMO is limited to 15 minutes (closing promptly at 9.45 am). Bidding in the OMO is available only to those counterparties who have registered with the Bank and signed the 2011 GMRA. The Bank's Operating Rules and Guidelines detailing the actual process are provided to counterparties and are also published on the Bank's website.[12] Box 7 highlights the key features of the Operating Rules and Guidelines.

When the Bank announces the OMO it also sets a minimum or maximum acceptable rate for each maturity date on offer. These rates are determined using market determined rates. Minimum rates are indicated when injecting cash and the Bank will not accept bids under this rate. Conversely, when withdrawing cash the Bank sets a maximum rate and will not accept a bid above this rate. OMO participants can choose to bid at these levels, or not. It is important to note that the Bank does not use the OMO to signal a policy stance or preference.

Box 7

Operating Rules and Guidelines

Rules are the non-negotiable aspects of any operation or tender with which counterparties must comply. Guidelines are aspects of operations which are desirably adhered to in the interest of operational efficiency.

The key features of the Bank's operating rules and guidelines explain:

- how to bid in the Bank's domestic market operations via telephone,
- the minimum size of bids,
- the allotment of successful bids, including any pro rating that may need to be calculated in the event of multiple bidders at the cut-off interest rate, and provide authority forms to nominate the people authorised to place bids on behalf of a registered bidder.

11 Details for an OMO can be found on RBNZ02 on Thomson Reuters and GPGX 1549 2 on Bloomberg.

12 Operating Rules and Guidelines can be found here: http://www.rbnz.govt.nz/markets-and-payments/domestic-markets/operating-rules-and-guidelines-for-the-domestic-markets-section-of-financial-markets-department/

Repurchase agreements

Under a repurchase agreement the Bank withdraws cash from the banking system by selling government bonds from its investment portfolio in exchange for cash on a given day. On a pre-determined maturity date, the Bank repurchases the securities in exchange for cash and the interest earned during the period of the repurchase agreement.

A reverse repurchase agreement is used by the Bank to inject cash into the banking system by purchasing repo eligible securities. The Bank accepts a wide range of repo-eligible securities but has discretion over which securities it is willing to accept in any given operation.[13] The full list of eligible securities can be found on the Bank's website.[14]

The Bank agrees to sell back those securities at a predetermined date, receiving cash and interest. There is no restriction on the period of the transactions, although, as noted earlier OMO counterparties tend to have a preference for shorter dates.

Foreign exchange swaps

Foreign exchange swaps can be used to inject or withdraw cash from the banking system. Foreign exchange swaps are the Bank's most utilised liquidity management tool as they allow the Bank to transact in a highly liquid, globalised market.[15] By entering into a foreign exchange swap, the Bank is able to influence the level of settlement cash with some certainty (in contrast to an OMO which can leave the level of settlement cash at undesired levels if un-bid or under bid). These characteristics make it easier for the Bank to inject or withdraw cash from the banking system.

Transacting in foreign exchange swaps also provides the Bank with numerous intangible benefits, such as the ability to build relationships with domestic and offshore counterparties and to source market intelligence.

The foreign exchange swap market provides New Zealand dollar liquidity to offshore banks and as such the Bank is tasked with ensuring that short-term interest rates in this market do not deviate significantly from the OCR. Such deviations are noticeable when the New Zealand dollar experiences a relatively large movement.

Also, foreign investors, not domiciled in New Zealand, typically hold US dollar assets and liabilities (as opposed to New Zealand dollar) which are not repo-eligible. Hence, such investors cannot participate in the Bank's operations to source New Zealand dollar denominated assets (be it cash or bonds). Thus, the foreign exchange swap market proves valuable to these investors.

The chart below depicts the movements in short-term interest rates in the foreign exchange swap market relative to the OCR since January 2014. It also shows the level of settlement cash over the same period.

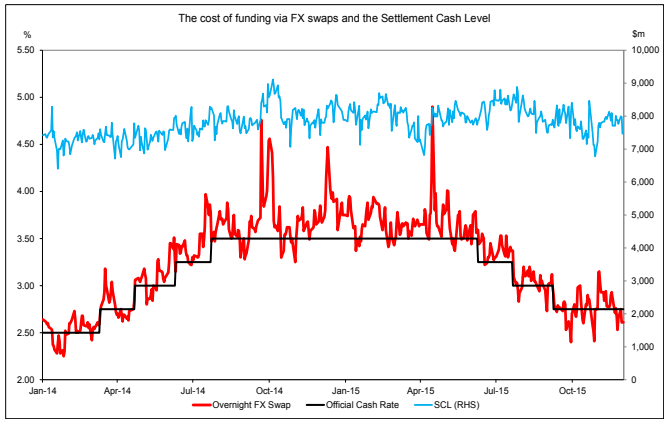
The Bank will actively monitor short-term interest rates in the foreign exchange swap market and will provide liquidity support should it be required. For example, if too much liquidity is in the foreign exchange swap market, then short-term interest rates will reflect this and trade below the OCR. In such cases, the Bank will look to withdraw some liquidity from the market. By doing so, the Bank will also be reducing

13 Prior to 11 December 2007 eligible securities were limited to government bonds, Treasury bills and Reserve Bank bills. From on 11 December, 2007, Kauri bonds have been accepted for use in the Bank's Domestic Market Operations. The range of acceptable securities was expanded further in June 2008.

14 A list of eligible securities can be found at: http://www.rbnz.govt.nz/markets-and-payments/domestic-markets/repo-eligible-securities-and-haircuts/

15 Based on the foreign exchange turnover survey released by the Bank of International Settlements in 2013, the average daily turnover for foreign exchange swaps globally was about USD 2 trillion, of which NZD denominated foreign exchange swaps saw an average daily turnover of USD 50 million.

Figure 2
The cost of New Zealand dollar funding via FX swaps and the OCR



Source: Reserve Bank of New Zealand

the level of settlement cash. Similarly, if short-term interest rates traded significantly above the OCR, the Bank would be required to inject liquidity via foreign exchange swaps. This would then result in an increase in the level of settlement cash. The Bank would inject or withdraw liquidity by entering into foreign exchange swap transactions to create the required effect. The Bank typically expects short term FX swap rates to trade around the OCR and will respond to pressures in the market.

The Bank uses its relationships with counterparties to determine reasons for market pressures and may transact in the market once an assessment of conditions has been made.

See box 9 for an explanation of a foreign exchange swap.

Box 9

Foreign exchange swaps

Foreign exchange swaps are one of the primary tools employed by the Bank. Foreign exchange swaps allow the Bank to inject or withdraw cash from the banking system on specified dates.

Foreign exchange swaps have two "legs" (or sides) to the transaction. When the Bank injects cash, the first leg will involve selling New Zealand dollars for another currency (usually US dollars) on a given day at a given exchange rate (e.g. 0.6740). The second or maturing leg of the transaction is when the NZ dollars are bought back at a future date at a predetermined exchange rate (e.g. 0.6700). In this instance, the 0.0040 difference in the exchange rates between the first and second legs is referred to as forward points. These reflect the differential between New Zealand and the United States interest rates. In this example, the Bank invests the US dollars received in the first leg for the same term as the foreign exchange swap. By performing a specific calculation using the US investment rate and the 0.0040 interest rate differential, it is possible to calculate a New Zealand interest rate return for the Bank.

Sale of Reserve Bank bills

The Bank has the ability to sell Reserve Bank bills in order to withdraw liquidity from the system. Reserve Bank bills were widely used by the Bank during the Global Financial Crisis (GFC) as a means of withdrawing excess liquidity from the system.[16] Reserve Bank bills have the same

16 The Bank ceased issuing Reserve Bank bills on 5 February 1999, about when it looked to cash-up the banking system. Reserve Bank bills were re-introduced in November 2008 to help manage the liquidity of the banking system.

characteristics as NZDMO's treasury bills (i.e. they are a security sold at a discount[17] to par and carry no coupon).[18] Reserve Bank bills are generally issued for terms of one week to one month while the NZDMO's treasury bills are typically issued in fortnightly tenders with maturities of three, six and 12 months as part of the government's borrowing programme.

As noted above, the Bank can sell Reserve Bank bills when conducting a withdrawal in the OMO (i.e. alongside a repurchase transaction). Due to the nature of the OMO, there can be time lags between operations resulting in irregular issuances of Reserve Bank bills. The maturities of the Reserve Bank bills sold in the OMO can also vary depending on the Bank's assessment of liquidity in the banking system. Therefore, the Bank also gives the market the opportunity to purchase 7 and 28 day Reserve Bank bills via regular Monday and Wednesday tenders. Each tender sees a minimum amount currently set at $100 million bills offered across both the 7 and 28 day maturities. The amount of Reserve Bank bills offered in the tender can vary depending on the Bank's assessment of system liquidity.

The tender details (amount of bills offered, maturity dates offered and maximum bid rates) are announced at 11:00am on the day of the tender. The tender is held at 2:00pm with the bidding window open for 15 minutes (closing promptly at 2:15pm).

The Bank sets the maximum rate at which it will accept bids prior to the tender, and then issues Reserve Bank bills to the successful bidder(s).

Where counterparties bid at similar rates across the two maturity dates, the Bank has the discretion to sell the Reserve Bank bills at its preferred maturity, or pro-rata between the winning counterparties. The Bank does not, at any time, indicate a preferred date to the market.

Box 10 provides liquidity management statistics (for the tools described above) for the year to September 2015.

Box 10
Liquidity management statistics for the financial year to September 2015 - total outstanding

Facility	Maximum amount ($)	Minimum amount ($)	Daily average ($)
Reverse repurchases	500m	0m	50m
Repurchases	1,600m	0m	500m
Reserve Bank bills	3,600m	300m	2,200m
FX swaps	11,500m	6,500m	8,900m

17 A 28-day Reserve Bank bill with a face value of $1 million and sold at a rate of 2.50 percent will cost $998,085.86. When the Reserve Bank bill matures, the holder of the bill will receive the face value (i.e. $1 million).

18 Nominal government bonds carry a coupon, which is the interest amount paid semi-annually in arrears. Inflation-indexed bond coupon interest is paid quarterly in arrears.

Government bond repurchases

The NZDMO has various bond maturity dates along the yield curve. Generally there is a bond maturity every one or two years, with the amount maturing for a nominal bond normally about $10 billion. The maturity of these bonds would have a significant influence on the banking system, due to the large influx of cash resulting from the maturity. It is the Bank's responsibility to mitigate or minimise the impact this influx of cash would have on the banking system and short term interest rates (i.e. a cash inflow of this size would push rates down significantly). One method of doing so is by buying back the bond prior to its maturity.

After consultation with NZDMO, about six to 12 months prior to maturity, the Bank will normally advise the market that it is prepared to receive offers from them for the purchase of the bond. If the Bank offers this facility it allows any counterparty meeting our credit requirements to approach the Bank during the day with an offer to sell the bond to the Bank, noting the volume and the rate at which they wish to sell. The Bank will assess this rate and will relate it to its activities in other liquidity management operations (e.g. OMO, foreign exchange swaps). If the Bank is happy with the price, it will nominate a settlement date, which helps to manage government cash flows. If the counterparty agrees with the date, the Bank will enter into the transaction.

The NZDMO completed a buy-back programme for the most recent maturing nominal bond in 2015, prior to the Bank entering the market on the NZDMO's behalf. The primary reason for the NZDMO's buy-back in this instance was to reduce its refinancing risk at maturity. The NZDMO is not committed to undertaking buy-back programmes on a regular basis.

These purchases have the impact of breaking down the maturity flow, staggering them over time. This makes it easier for the Bank to manage the flows closer to the bond's maturity date. If the Bank repurchases bonds, it can either hold them on its balance sheet until maturity, or alternatively, it can on-sell the bonds to the NZDMO who then cancels the security.[19] The Bank will advise the market when it will no longer purchase the maturing bond.

Selecting maturity dates for liquidity operations

When selecting maturity dates for monetary operations, careful attention is paid to our cash flow forecasts and current market conditions. Maturity dates are selected in an effort to bring future daily flows to a manageable level. The Bank has the discretion to offer maturities as far out as required.

In the case of an OMO, when conducting larger OMOs (i.e., $600 million or more), the Bank typically prefers to offer shorter maturities (such as overnight). If the size of the OMO is large, the Bank can also offer more than one maturity date for the securities being transacted in the OMO, giving participants more choices. When offering multiple dates, it is likely that the Bank will have a preference based on its liquidity management requirements.

If the intended maturity date crosses an OCR date, the Bank will always offer a maturity date that is before, or on, the OCR date in the OMO as well as the intended maturity date. This allows market participants bidding in the OMO the option of not having to transact beyond the OCR date. For example, if the market consensus of opinion is that the Bank will lower the OCR rate at its next review, bidders will not be keen to borrow money at a higher rate than what they could once the OCR rate is reduced. Bidders tend to have a preference for shorter-dated

19 If you recall, flows between the Bank and the NZDMO do not impact the system.

transactions, as they prefer not to have securities tied up for too long. However, OMO counterparties have the ability to substitute securities already sold to the Bank for other securities, if they require securities back before the OMO transaction matures. This is done at a small cost to the counterparty.

Similarly, when transacting in FX swaps careful attention is paid to cash flow forecasts and maturity dates are then selected. The Bank will generally look to inject cash via FX swaps for days where a tax flow has been forecast (e.g. the 28th of each month when GST is paid to the Government) and will look to mature FX swaps on days where departmental expenditure flows are being forecast (e.g. the 4th of each month when the Government provides funds to departments for operating expenses).

Assessing the outcome of liquidity operations

The primary aim for the Bank when conducting an OMO or dealing in an FX swap is to smooth out daily government revenue and expenditure impacts, thereby leaving the desired amount of settlement cash in the banking system which will likely result in short-term interest rates trading at, or around, the OCR and ensure the payments and settlements system functions soundly. Regardless of the type of operation being conducted, the primary measure of a successful operation, whether an injection or withdrawal via OMO, foreign exchange swaps etc., is for the full amount to be transacted. In the case of an OMO or Reserve Bank bill tender, the Bank will also look to have the majority of successful transactions going to our 'preferred' maturity date. While it can be argued that an element of success is to receive bids in the OMO and Reserve Bank bill tender at a margin to either our maximum or minimum rate, it is not the Bank's primary objective.

Standing facilities

The Bank's standing facilities are open to approved counterparties on a regular basis. The standing facilities outlined below give eligible parties the ability to borrow cash and/or bonds from the Bank in the event they are unable to source these assets from the marketplace. The decision to use the facilities outlined below rests solely on the Bank's counterparties.

Overnight Reverse Repurchase Facility

There may be occasions when an ESAS account holder or other institution is unable to acquire cash from any other bank. When this happens the counterparty is able to exchange securities for cash with the Bank for one working day. The only restriction on the amount the counterparty may request is the value of the acceptable securities held by the borrower.

The Bank can enter into these overnight agreements with any counterparty that has signed the 2011 GMRA, through an on-demand facility known as the Overnight Reverse Repurchase Facility (ORRF). Under this arrangement, the Bank credits the counterparty's settlement account with the required amount of cash and buys the eligible securities from the ESAS account holder. These securities are bought by the Bank on contractual terms that require the ESAS account holder to buy the securities back and repay the cash they borrowed plus interest.[20]

20 As mentioned earlier in the article, the Bank currently charges a rate of OCR + 50 basis points on cash balances borrowed. The margin was increased to OCR + 50 basis points from OCR + 25 basis points on October 2006 in conjunction with the Bank moving to a cashed up banking system. There was a brief period in 2012 when the Bank reduced the cost of the ORRF to OCR + 25 basis points between 30 January and 30 April to accommodate the introduction of Settlements Before Interchange.

The facility is open to all registered counterparties from 9.00 am to 12.00 noon. In addition, ESAS account holders can approach the Bank between 2.0 pm to 4.30 pm and 7.30 am to 8.00 am the following business day to access the ORRF.

Automated ORRF ("AutoORRF")

Overnight repurchase transactions may be entered into electronically through ESAS.

The AutoORRF is an automated facility between the Bank and ESAS account holders. ESAS account holders must have signed a 2011 GMRA.

ESAS accounts holders can obtain cash in order to enable the continuous flow of payments to other market participants. This facility is generally for use outside of normal business hours. Participants can flag their account to automatically repurchase securities should their NZD account balance reach zero (or a higher predetermined threshold).

Eligible securities for Auto Repo are:

- New Zealand treasury bills
- New Zealand government bonds – excluding inflation-indexed bonds
- Reserve Bank bills.

Counterparties are deemed to have agreed to an inter-day borrowing each time an ORRF transaction is triggered and incur a charge equivalent to the Overnight Reverse Repo Rate.

The ORRF proved useful during the Global Financial Crisis (GFC). During this period, the Bank expanded the list of securities deemed eligible for repurchase such that a wider number of assets were accepted by the Bank for repurchase. This helped provide some certainty to markets domestically and gave the banks access to liquidity while they held eligible assets.[21] The ORRF remains particularly relevant to the New Zealand financial system given Continuous Linked Settlement (CLS)[22] payments and the recent introduction of Settlement Before Interchange (SBI),[23] which occur predominantly during the evening session (i.e. post 5.00pm).

The provisioning of securities in exchange for cash ensures that the Bank does not expose itself to credit risk. Similarly, the Bank offsets any market risk associated with these transactions (i.e. the risk that the market value of the provided securities may fall due to a rise in interest rates) by applying a 'haircut' to the security purchased in the transaction.[24] The Bank calculates the face value of the security required using the security's prescribed haircut which can be found on the RBNZ website. Market convention means that generally ORRF transactions are repaid within the first hour of the following day's trading and the securities are sold back to the ESAS holder.

21 Alongside the expansion of eligible securities, in June 2008 the Bank also standardised the margin applied for the use of the ORRF to be the same across all eligible securities.

22 More information on CLS settlement can be found at: http://www.cls-group.com/Pages/default.aspx

23 More information on SBI can be found at : http://www.paymentsnz.co.nz/articles/payments-nz-settlement-before-interchange-project

24 The term 'haircut' refers to the required over-collateralisation of a security, pledged to the Bank, typically for cash by a counterparty and reflects the Bank's perceived risk of loss when holding the security until the transaction matures.

The bond lending facility

The bond lending facility is not a primary liquidity management tool. Like the ORRF, the bond lending facility is a 'standing facility' available to approved counterparties. The facility allows approved counterparties to borrow New Zealand government bonds from the Bank's Investment Portfolio. Counterparties will tend to use this facility when a bond is difficult to source in the secondary market. This facility also aims to mitigate settlements failures in the inter-bank market.

The facility is open daily from 2.00 pm to 2.30 pm (although counterparties are able to approach the Bank up until 4.00 pm). Should a counterparty wish to borrow a specific security, they are required to contact the Bank via the operational dealing line and outline the bond and the amount that they wish to borrow. The Bank charges the borrower a rate 150 basis points under the OCR for each bond borrowed. The bonds are lent on an overnight to 1-week basis. Counterparties who have executed a 2011 GMRA with the Bank can use this facility.

While the Bank typically has holdings of each of the New Zealand government bond maturities, it does not guarantee the availability, in part or in full, of a particular bond. It is possible for the Bank to deplete its holdings (or part of) of a particular bond during the course of the day's operations and as such be unable to facilitate the borrower's request for a particular bond. This is not a common occurrence however, as the Bank ensures a minimum balance of each bond remains in its portfolio on any given day.

Repurchase facility

The repurchase facility offers to lend bonds via a tender process. The facility can be used by counterparties when they need a specific bond. This facility is offered every Monday, Wednesday and Friday at 9.30 am where an OMO withdrawal operation is not offered.

Details of the facility are announced in a similar fashion to the OMO and are open to tenders for 15 minutes (closing promptly at 9.45 am). Bidding in the facility is open to all counterparties who have executed a 2011 GMRA with the Bank.

The Bank will lend up to $250 million of bonds in the facility (subject to the availability of bonds). To use this facility, counterparties must bid at a maximum rate of OCR less 70 basis points or less.

5 Current issues

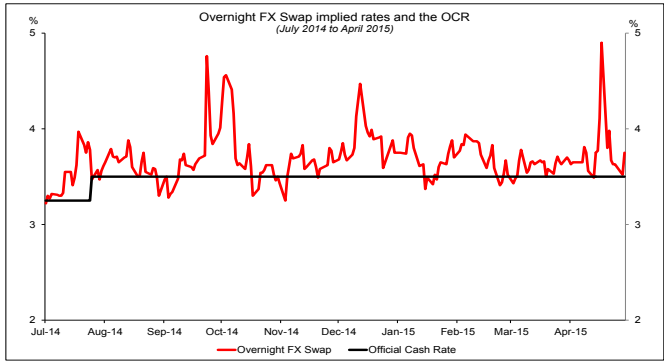
One of the issues facing the Bank at present is the lack of liquidity in markets. At present, this is leading to periods of increased volatility, especially in short-term interest rate markets. Recently, a more rigid regulatory environment appears to have had an impact on the behaviour of market participants, and therefore market liquidity. In some instances market participants have been reducing activity, and in some cases exiting markets where the cost of regulation-based activity is deemed to exceed any potential return.

This had led to increased volatility in the short dates of the FX swap market, especially when there are large movements in the NZD/USD exchange rates which often lead to market participants having excess positions to fund or invest.[25] While the spike in short-term rates has not

25 Typically, positioning in the NZD/USD exchange rate is short term in nature so market participants fund short NZD positions (or invest long NZD positions) in the short term FX swap market.

necessarily been higher than normal, we have seen more prolonged events of volatility. If these events continued, it would have a detrimental effect on the market's confidence and their ability to fund, or invest, their positions. Figure 3.1 below shows where the overnight FX swap rate is trading relative to the OCR. The figure illustrates the volatility in overnight FX swap rates. The period between late September and early October 2014, mid December 2014 and late April 2015 are all examples of situations where liquidity became scarce in the FX swap market.

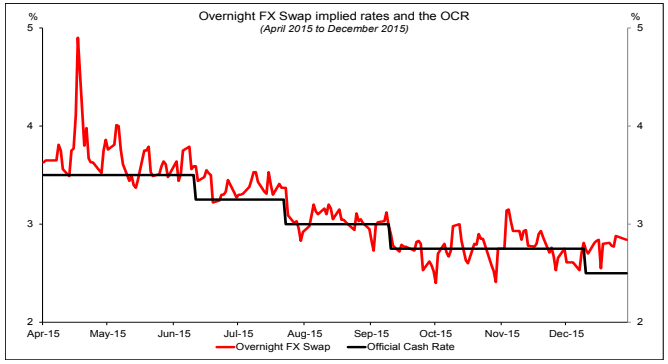
Figure 3.1 Prolonged period of volatility in overnight FX swap rates.



Source: Reserve Bank of New Zealand

As a result of this the Bank has increased its capacity to trade in the short-term FX swaps and has been more proactive in responding to signs of volatility. As a result of this move the Bank has been injecting larger volumes of cash into the banking system using FX swaps which would ordinarily increase the level of settlement cash. Although a higher level of settlement cash is usually warranted in such circumstances, the Bank is not inclined to change the level significantly over a short period of time as this could add to the volatility. To offset these flows the Bank will use withdrawals in the OMO and the sale of Reserve Bank bills to reduce the impact on the settlement cash balance. This has essentially replaced liquidity in the market and seemingly had the desired impact. Figure 3.2 below shows a period of relative stability in overnight FX swap rates since May 2015.

Figure 3.2 Evidence of stability after the Bank increases support.



Source: Reserve Bank of New Zealand

However, this activity raises a fundamental question for a central bank. How big should a central bank's footprint be in the market place? This question is even more valid for small and relatively illiquid markets. Typically, in the past, central banks have been the marginal supplier of liquidity to the banking system and have relied on market participants to distribute cash balances and to remove any anomalies in pricing (e.g. spikes in short term rates). However, this convention has been somewhat broken post the GFC when central banks supported multiple markets and have continued to do so in subsequent years. To date the need for the Bank to support liquidity in the FX swap market has been sporadic, which has provided a degree of comfort.

6 Conclusion

One of the Bank's overarching objectives is to ensure that monetary policy is implemented by having short-term interest rates as close to the OCR as possible and ensuring that the banking system has sufficient liquidity to enable the payments and settlement system to function in a sound and efficient manner. The Bank achieves this by paying careful attention when forecasting government cash flow and effectively conducting operations (e.g. OMOs and foreign exchange swaps) to offset these flows to avoid considerable swings in the level of settlement cash that sits in the banking system.

The implementation of monetary policy is heavily influenced by the Bank's use of settlement cash. The Bank is able to influence short term interest rates by increasing or decreasing the settlement cash balance, ultimately affecting the balance of ESAS account holders. The Bank does this by using the OMO, FX swaps, Reserve Bank bills and other operations available to it. In times of volatility the Bank may use a combination of these tools to reach its objective.

Effective management of liquidity plays a crucial role in our banking system. It allows the Bank to implement monetary policy, ensures the efficacy of New Zealand's payments and settlements systems and allows the Bank to ensure that the public has confidence in New Zealand's banking system.

In the near term, issues relating to diminishing liquidity in markets will be at the forefront of the Bank's mind as it determines how to best respond to these changing market conditions.

7 Bibliography

Katz P, (1987), 'The basics of liquidity management' Reserve Bank *Bulletin*, Vol 50 No.3, 1987

Archer, A and A Brookes and M Reddell (1999), 'A cash rate system for implementing monetary policy' Reserve Bank *Bulletin*, Vol 62 No.1, 1999

Tait, J and M Reddell (1991), 'The operation of monetary policy' Reserve Bank *Bulletin*, Vol 54 No.1, 1991

Brookes, A (1999), 'Monetary policy and the Bank balance sheet' Reserve Bank *Bulletin*, Vol 62 No.4, 1999

Frazer, J (2004), 'Liquidity management in the New Zealand banking system' Reserve Bank *Bulletin*, Vol 67 No.4, 2004

Nield, I (2006) 'Changes to the liquidity management regime', Reserve Bank *Bulletin*, Vol 69 No.4, 2006

Nield, I (2008) 'Evolution of the Reserve Bank's liquidity facilities', Reserve Bank *Bulletin*, Vol 71 No.4, 2008

Hill, D (2013), 'Liquidity management in the New Zealand banking system'. Unpublished manuscript

Bank of International Settlements (2013), "Foreign exchange turnover in April 2013: preliminary global results" Triennial Central Bank Survey, accessed at http://www.bis.org/publ/rpfx13fx.pdf/ on February 01, 2016.

Reserve Bank of New Zealand (2006), ‘Reform of the Reserve Bank of New Zealand’s Liquidity Management Operations’ accessed at http://www.rbnz.govt.nz/news/2006/06/liquidity-operations-reform/ on March 16, 2016.