Payment system reform in New Zealand – the start of real time gross settlement

Bruce White, Economics Department

From March 1998, the inter-bank settlement of most high value wholesale payments in New Zealand will occur on a real time gross settlement (RTGS) basis. This means that the inter-bank transfer of funds associated with each such payment will be posted to the exchange settlement accounts of the paying and receiving banks at the Reserve Bank, transaction by transaction, irrevocably and ahead of value being credited/debited to the banks' respective customers. Up until now, the inter-bank transfer of funds has not occurred until the end of each banking day.

The introduction of RTGS will remove the inter-bank exposure that banks have carried when they give irrevocable value to their customers ahead of the time they receive inter-bank settlement of those payments. And where this exposure does not exist because the payments could be reversed should the paying bank fail to settle, RTGS provides a mechanism that enables the spectre of such reversals to be eliminated.

In wholesale financial markets, where daily inter-bank payments volumes are very large – over NZD30 billion each day on average – and where timely and certain settlement of transactions is critical for the efficient functioning of the markets, the risks to the financial system from these sources up to now have been large. Indeed, they have constituted a considerable part of what central banks call 'systemic risk'. But with the advent of RTGS in wholesale settlement systems, the level of systemic risk in the financial system will be very substantially reduced.

1 The payment system – an overview

In New Zealand there are a number of ways by which a bank customer can instruct its bank to make payment for the credit of another party. These include cheques, electronic funds transfer at point of sale (EFTPOS),[1] telephone banking, direct debits, direct credits, and, in the case of wholesale market payments, which are the focus of this article, dedicated computer-based messaging systems.

These payment instructions are processed in a series of systems commonly referred to as payment 'switches'. The main wholesale payment switches are Austraclear[2] for securities and cash transactions, and the Kiwi Inter-bank Transfer System (KITS) for the NZD leg of foreign exchange transactions. EFTPOS and the majority of credit card transactions are processed by Electronic Transaction Settlements Limited (ETSL) (and, in the case of one bank, by its own 'switch') and cheques, direct debits and direct credits by Interchange and Settlement Limited (ISL).

The function of payment switches is to capture the information contained in the payment instruction, and to direct the relevant debits and credits to the banks whose customers are the parties to the transaction, where they are posted to customer accounts. This process is known in the banking industry as 'interchange', a term which originates from the practice whereby banks physically exchange the cheques lodged over their counters that have been drawn on other banks.

In banking systems where inter-bank settlement occurs on an end-of-day net settlement basis,

[1] In this article the names of a number of components of the payment system are referred to by their acronyms. Where the acronym has not entered more general usage, the complete name is given the first time it is referred to, followed by the acronym in parentheses.

[2] The Austraclear system in New Zealand is operated by the Reserve Bank under licence from Austraclear Limited. For further details see Anderson (1993).

Table 1
Calculation of net, and net net, inter-bank settlements

In this (highly summarised) example, there are three banks (Bank A, Bank B, and Bank C), each of which has three customers (a1, a2, a3; b1, b2, b3; and c1, c2 and c3). There are two payment switches, Switch X and Switch Y.

		Inter-bank settlement		
	Customer transaction	**Bank A**	**Bank B**	**Bank C**
Switch X scoresheet	a1 pays b1 $20	-20	+20	
	b2 pays c1 $30		-30	+30
	c2 pays b2 $10		+10	-10
	Net inter-bank settlement	-20	0	+20
Switch Y scoresheet	a2 pays b3 $50	-50	+50	
	b3 pays c3 $10		-10	+10
	c3 pays a1 $40	+40		-40
	Net inter-bank settlement	-10	+40	-30
Net net inter-bank settlement		-30	+40	-10

the switches also keep a 'scoresheet' of the corresponding amounts that banks need to settle amongst themselves at the end of the day, to match the debits and credits they have passed to their respective customer accounts. After the day's processing has been completed, the central bank is advised of a single net amount that needs to be paid, or received, by each bank to achieve inter-bank settlement of the day's business. These net end-of-day balances are posted to each bank's settlement account at the central bank, and a 'net net' settlement amount for each bank, across all switches, is then determined (see table 1 for a simple example of how the netting process works).

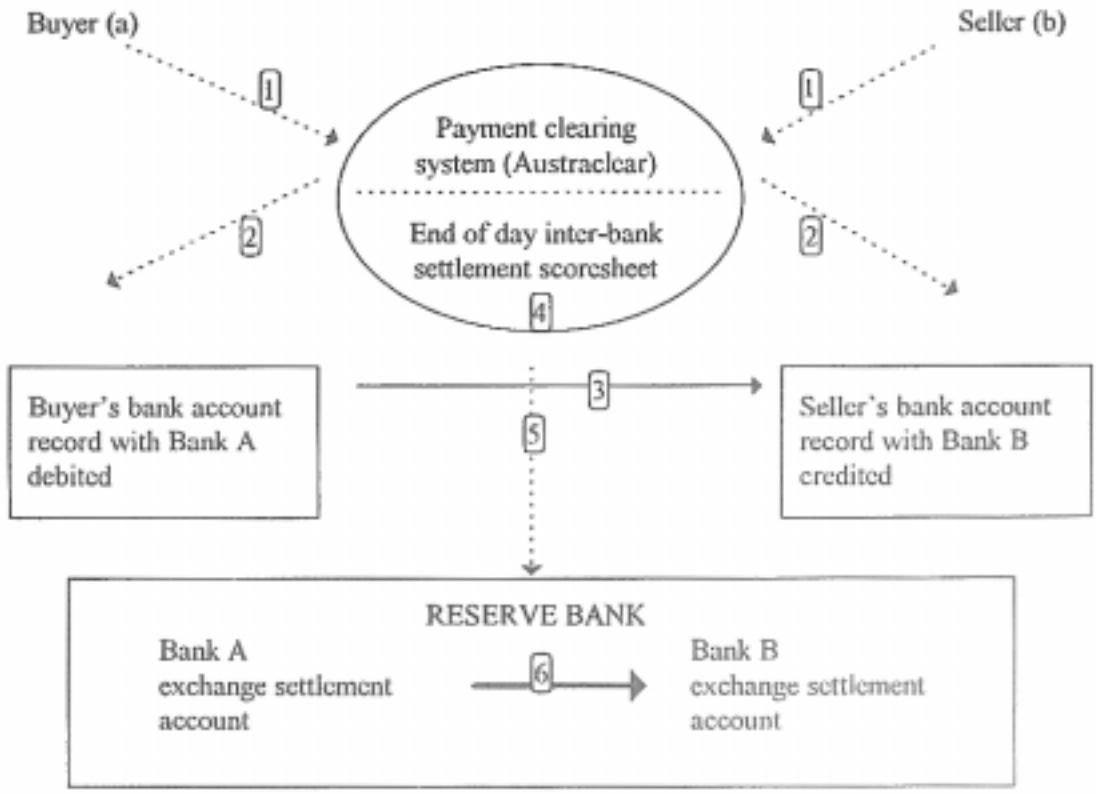
At this stage in the process, in New Zealand, those banks that would have a debit balance in their exchange settlement account need to fund the account, either by borrowing from those banks with a credit balance or by selling ('discounting') Reserve Bank bills back to the Reserve Bank. As most retail transactions are processed by switches overnight, the calculation of the net settlement amounts to be posted to the banks' exchange settlement accounts and the funding of these accounts actually occurs early on the morning of the next calendar day (but is value-dated the previous business day).

An illustration of the *sequence* of the steps involved, based on a bond transaction in the Austraclear system under the out-going (pre-RTGS) arrangements, is given in box 1. An important point to note from box 1, which goes to the heart of the motivation for introducing RTGS, is that interchange of the payment between the buyer and seller's bank precedes inter-bank settlement. Payments made early in the day are not 'settled' inter-bank until the morning of the next day, that is until nearly 24 hours later. Indeed, in the case of a transaction settled between the buyer and seller on the day preceding a weekend, the delay can be for as long as up to three days, and even longer in the case of a long weekend.

This time gap between 'interchange' and 'settlement' raises the question: what would be the position if a bank were to fail after payment instructions have been interchanged, but before they have been settled? This is not just an academic question. Banks can and occasionally do fail. And the time of day that failure occurs – that is the time at which the 'doors are closed' and transactions cease being processed

Box 1

A bond transaction with end-of-day net inter-bank settlement



Key:

Payment instructions (messages) ·····▸

Money flows ——▸ of commercial bank deposit balances between customers

——▸ of central bank deposit balances between banks

Sequence:

1. Buyer and seller enter the transaction into the Austraclear system. Austraclear checks that the transaction details submitted by the buyer and seller match and that the buyer has sufficient funds in its Austraclear account to make the purchase. If all details are in order …
2 & 3. Austraclear debits and credits the respective customer bank account records.
4. Meanwhile, the amounts for the respective banks to settle between themselves on their exchange settlement accounts at the Reserve Bank are added to the 'scoresheet', so that a net settlement amount (for all the transactions processed by Austraclear that day) can be calculated at the end of the day and…
5. is sent to the Reserve Bank …
6. where inter-bank settlement is effected on the banks' exchange settlement accounts at the Reserve Bank.

Note that interchange 3 precedes settlement 6

– cannot be relied on to occur conveniently only after a day's business has all been processed and settled. Indeed, given that all except one of the banks operating in New Zealand are branches or subsidiaries of banks based overseas, it is likely that the timing of the 'closing of the doors' will, in practice, be largely out of the hands of the New Zealand authorities. Rather, the key decisions will likely be taken abroad, in a different time zone, meaning that the timing of the closure of a bank here could be at any time of the day.

The answer to the above question is not one we can give on the basis of precedent, given that in New Zealand no bank has failed – in the sense of closing its doors for business – this century. Partly for this reason, partly because of new technologies, and partly because aspects of interchange and settlement have been governed by convention rather than by contract, this is an area where outcomes would not be entirely certain.

But the broad picture has been reasonably, and disconcertingly, clear. One scenario is that the 'surviving' banks would be 'stuck' with having to credit their customers for payments they had received through the interchange, even though the payment would unlikely be settled by the (failed) bank on which it had been drawn. In this case, the surviving banks would become unsecured creditors for amounts due to them by the failed bank, but would still need to meet their own settlement obligations to the failed bank.[3] As discussed below, these amounts due could be very large, meaning that the risk of financial loss would be correspondingly large – possibly sufficiently large to place the solvency of one of more of the surviving banks also in doubt.

Alternatively, payments drawn on the failed bank that have been interchanged, but which remain unsettled, could possibly be reversed. For example, it seems likely that surviving banks would return cheques drawn on the failed bank as 'unpaid' and reverse out the amounts they had credited to customer accounts. Whether other payments, such as those interchanged in KITS and in ETSL (eg EFTPOS transactions) could legally be reversed is less clear. And, irrespective of the legal position, other considerations might make reversing transactions an impracticable option, since it is not clear whether switches would be capable, in the time available, of re-running the interchange exclusive of payments drawn on the failed bank. Moreover, reversing out payments made to settle wholesale market transactions would result in 'knock-on' effects in those markets: that is the failure of one security or foreign exchange transaction would cause other transactions, which had been entered into by the parties in anticipation of preceding transactions settling, also to fail.[4] An analogy is how a house sale that 'falls through' can cause other sales also to fall through – except that in the wholesale financial markets the 'knock-on' effects would be on a much grander scale. So while reversing out payments drawn on a failed bank might avoid systemic risk stemming from financial losses to, and the consequential failure of, other banks, it would almost certainly cause other forms of systemic disruption.

In today's banking system, the total value of payments interchanged amongst banks each day averages about NZD35 billion – which is equivalent to nearly 35 percent of New Zealand's *annual* GDP[5]. Of this amount, about NZD30 billion is attributable to wholesale financial market transactions. It is not difficult to see from these numbers, and in particular those that

[3] Note that there would be no offset for settlement obligations due by surviving banks to the failed bank, unless expressly provided for. No such provisions currently exist in New Zealand although legislative amendments have been proposed to make it possible for banks to establish enforceable netting arrangements to apply in this circumstance. See Zodgekar (1996).

[4] Additionally, the surviving banks would experience liquidity pressures. They would have to pay away on their own (including own customer) payments, while payments expected to be received from the failed bank would be suspended. In such a situation, the Reserve Bank might need to undertake open market operations to liquefy the banking system.

[5] The total amount of payments made each day in New Zealand is larger still, since many payments are made and received by customers of the same bank. These are known as 'on us' payments, since they do not involve any inter-bank interchange or settlement.

relate to the wholesale markets, that the systemic risks inherent in deferred net settlements are potentially huge. Indeed, the exposures are of such a magnitude that they are considered by many to constitute a large part of the so-called 'too big to fail' problem; that is, the prospect that a bank which is a significant provider of payments services might have to be rescued with public funds to avoid serious damage to the financial system.

2 Reform options[6]

Reducing payment system risk has been a policy priority of many central banks since the mid to late 1980s. Work on the issue commenced in the Reserve Bank of New Zealand about 1990 and, in common with most central banks, our first priority has been to address the risks inherent in high value wholesale payment systems. This reflects that these payments generate by far the largest inter-bank exposures and/or that rolling unsettled wholesale market transactions backwards could cause serious problems in wholesale markets (and, in the case of Austraclear payments, contractual obligations mean that transactions cannot be rolled back). The majority of payments by cheque, direct debit, direct credit, and other similar payment instrument are for smaller amounts and the inter-bank risk exposure issues are not so acute.

From the initial exploratory work at the Reserve Bank, two main models were identified for dealing with the risks inherent in the high value payment systems.

One option was for the risks inherent in end-of-day, net, inter-bank settlement systems to be recognised explicitly as inter-bank credit exposures, with these exposures being allocated to and managed by the banks that comprise the payment system. This is the model adopted by the Clearing House Interbank Payments System (CHIPS) in the United States, which is the main system used for making the USD payment in foreign exchange transactions in which the USD is one of the currencies transacted.[7] In this system, each participant is responsible for setting its own limits on the amount of unsettled payments it is *willing to accept* from each of the other participants in the system, and each participant is additionally subject to a limit on the aggregate amount of unsettled payments it is *permitted to have outstanding* to all other members. Moreover, these limits are required to be supported by collateral posted with the clearing house, to provide a high level of assurance that any losses incurred will be absorbed by those participants that accepted the risk.

Through such a structure of limits, supported with collateral, the participants in the system impose market discipline on each other, and in a framework that reduces systemic risk to a very low level, albeit still within an end-of-day net settlement structure. Each bank can increase, or decrease, the amount of unsettled payments it is prepared to accept from any other, according to how it views the creditworthiness of its counterparties. An advantage of this approach is that it places responsibility for managing payment system risks on the participants in the system, who generally will be best placed to play that role. It also retains the efficiencies – in terms of liquidity – of being able to net a large number of transactions down to a much smaller single settlement amount for each bank. The disadvantage is that the risks, albeit much reduced and managed, still reside with the receiving banks, so that if a bank were to fail other banks would likely incur losses as a result.

The alternative model is Real Time Gross Settlement (RTGS), where individual payments are settled in banks' central bank accounts continuously, or in real time, and ahead of, or at least contemporaneously with, the payments interchange. This approach has the advantage of eliminating inter-bank risk in the payment system, but it creates a need for banks to have, or

[6] For further background on the reform of the New Zealand payment systems, see Tait (1992), (1993) and (1995)(a).

[7] In New Zealand this business is handled by KITS. For an overview of the US payment systems, see BIS (1993) 'Payment Systems in the Group of Ten Countries', December.

to be able to generate, throughout the day in real time, the balances in their Reserve Bank accounts required to fund outgoing payments. Whereas in end-of-day net settlement systems, banks need fund only the net of each day's payments (inwards and outwards), RTGS requires that banks have a greater capacity to fund a sequence of, possibly large, outgoing payments. In other words, there is significantly less scope to rely on incoming payments as a natural source of liquidity available to fund outgoing payments. For example, recent data indicates that approximately 25 percent by value of the individual wholesale market payments interchanged through Austraclear and KITS exceed NZD100 million, and individual transactions of NZD700-800 million are not uncommon. If, in a real time environment, two or three payments of this order of magnitude were required to be settled by a bank consecutively, then that bank will need to have, or have raised, several hundred million dollars of cash in its Reserve Bank account. This compares with the very much smaller end-of-day 'cash target' under present arrangements – currently NZD5 million for all banks combined.

A range of approaches for meeting the liquidity requirements of an RTGS payment system exist, although they can be broadly categorised as follows:

- banks have access to central bank intra-day credit;
- banks hold sufficient credit balances in their central bank accounts to cover their payments business needs;
- banks have access to a central bank liquidity facility, under which they can temporarily liquefy assets, ie sell assets they hold to the central bank, subject to an obligation to repurchase those assets.

An example of a payment system in which the central bank extends intra-day credit to provide liquidity is the Fedwire system operated by the Federal Reserve in the United States. Fedwire is a real time gross settlement system in which payments are final and irrevocable when processed by the Federal Reserve.[8] As a general matter, certain Fedwire participants are permitted to run intra-day overdrafts in their Federal Reserve accounts as a result of Fedwire payments, subject to certain limitations and conditions. For example, since 1986, Fedwire participants have been subject to limits on the total amount of overdrafts they may incur. Furthermore, the Federal Reserve has sought to reduce the overdraft exposures it faces as a result of inter-bank settlements occurring across its books. The most notable policy initiative in this area has been the introduction of intra-day overdraft fees in April 1994 and an increase in those fees in April 1995. The introduction of daylight overdraft fees resulted in a 40 percent decrease in the amount of intra-day credit outstanding.

The most prominent example of the second of the above three approaches to liquefying a RTGS payment system - that is, where banks carry larger cash balances themselves – is the Swiss Interbank Clearing (SIC) system introduced by the Swiss National Bank in 1987. Swiss banks are required to maintain sufficient credit balances in their accounts at the Swiss National Bank to cover the liquidity requirements arising from real time settlement of the payments they and their customers make.[9]

More recently, quite a number of countries have moved to introduce RTGS systems which mirror a number of features of the SIC system, but with the variation that liquidity is available under an intra-day repurchase agreement ('repo') facility with the central bank (the third of the above approaches). Countries that have implemented, or are in the process of implementing, RTGS systems which incorporate an intra-day repo facility include Australia, Hong Kong and the United Kingdom.

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[8] In the United States, Fedwire is the primary mechanism used by banks to adjust their accounts at the central bank and to make third party inter-bank funds transfers on behalf of their customers. The other primary inter-bank transfer mechanism is CHIPS, which nets payment obligations and settles its participants end-of-day net positions over Fedwire. The new ESAS system described in part 4 of this article will, in broad terms, be the New Zealand equivalent of Fedwire.

[9] See BIS (1993) op. cit.

3 The preferred strategy for New Zealand

The last mentioned approach was chosen for New Zealand – that is, RTGS, with an intra-day repo liquidity facility. There were a number of reasons for this choice.

First, a choice needed to be made between RTGS and building risk reduction features into the existing end-of-day net settlement system. Here it was recognised that an RTGS system provides a desirable foundation for the overall payment system for the economy. Desirably there should be a core, essentially riskless, mechanism by which payments can be made with as much certainty and finality as is legally possible[10] – including so that any end-of-day inter-bank payments made to settle transactions remaining in deferred net settlement systems, for example, ISL, can be made with that same high degree of certainty. Moreover, RTGS systems are becoming the international norm, and there are likely to be advantages from following international practice, including possibly in the area of Herstatt risk reduction (see section 6).

Moreover, the RTGS model was viewed as being consistent with a number of the elements of the overall policy that underpins banking policy in New Zealand. In particular, RTGS deals most effectively with the systemic risk in the payment system since it completely removes payment risk from receiving (surviving) banks. Systemic risk concerns arising from the possibility that failure by one bank to settle its payments might cause another bank, or banks, also to become insolvent, are therefore removed, not just reduced.

The issue of how to liquefy an RTGS system involved choosing between requiring banks to carry very much larger balances in their Reserve Bank exchange settlement accounts, or providing a Reserve Bank intra-day liquidity facility. Provision of Reserve bank intra-day overdrafts was not considered an option, given that it would have been totally inconsistent with the objective of reducing taxpayer risk. Correspondingly, a RTGS approach that requires the liquidity required to come from banks' own balance sheets is fully consistent with the philosophy that banking risk is primarily the responsibility of each bank's own shareholders and creditors/depositors. [11]

The preferred approach has been to create an intra-day repo facility, for two main reasons: it involves least change to banks' portfolio structures and liquidity management arrangements and also least change to the way monetary policy is implemented. Lying behind these considerations was a general desire to make no more changes in these areas, on account of the introduction of RTGS, than necessary (which does not, of course, preclude future changes where these are justified on their own merits).

4 The architecture of RTGS in New Zealand

Implementation of the chosen RTGS model for New Zealand has required that payment switches be linked electronically to banks' exchange settlement accounts at the Reserve Bank, and in such a way that payment instructions can be processed individually, in real time, and with the inter-bank settlement leg of each payment to precede interchange. To begin with, only the payments processed in the two principal wholesale payment switches – Austraclear and KITS – will be settled on a gross basis, since it is through these two systems that by far the larg-

[10] An existing potential legal impediment to the achievement of payment finality is that, in some circumstances, a liquidation, bankruptcy or statutory management might be deemed to commence retrospectively. Legislative proposals have been developed which, on being enacted, would remove this impediment. See Zodgekar (1996).

[11] A corollary is that the prime liquid assets of a bank will, under RTGS, be more substantially committed to supporting the payments business of the bank and that should the bank fail, these assets likely will not be available to pay out the remaining deposits of the bank. This serves to underscore the general point that the balance sheet – and in particular the prime liquid assets component of the balance sheet – of a bank that has a large amount of on-demand liabilities can change rapidly, particularly should a significant proportion of depositors decide to make payments out of (or in other words withdraw) their funds at the same time.

est payments are handled,[12] and thus where the largest systemic risks lie. Also, in some respects, the steps required to achieve RTGS on these systems are smaller than for most other switches, since both already *interchange* in real time. The other switches generally involve some element of 'batch' processing, for example, cheques are collected up and processed in mostly overnight batches, rather than one by one throughout the day.[13]

The major systems developments that have been involved in introducing RTGS have been:

- the building of a platform at the Reserve Bank, known as the Exchange Settlement Account System (ESAS), for electronic real time operation of banks' exchange settlement accounts. Under the current end-of-day deferred settlement arrangements, operation of these accounts is simple, given that only a handful of entries need to be posted to each bank's account each day. This enables the exchange settlement accounts to be maintained essentially manually on a simple spreadsheet system. With RTGS, each day about four thousand individual transactions, on average, will be posted to banks' accounts at the Reserve Bank, making an automated electronic system essential;
- the building by the banking industry of a system which will sit between the payment switches and ESAS at the Reserve Bank. This system, to which each of the existing settlement banks has chosen to be linked, has been designed to provide banks with a capacity actively to manage the flow of payments drawn on their bank; for example, to order payments in a sequence which meets their customer needs. This system is known as Settlement Request Manager (SRM);
- construction of a real-time link between ESAS and the Austraclear securities depository, which is also operated by the Reserve Bank, to facilitate the operation of the intra-day repurchase agreement liquidity facility. Again, given that there will at times be several hundred of these transactions per day, functionality has been developed to enable this facility to operate automatically. That is, a bank will be able to specify parameters such as the amount of its payments that may be delayed in a holding queue (pending sufficient liquidity coming available) before the system will automatically trigger a sale of securities designated by the bank under a repurchase agreement. Similarly, the repurchase leg later in the day will occur automatically.

The Reserve Bank will not be charging banks any funding costs for the intra-day liquidity it provides. This reflects that the Bank will not be incurring any intra-day funding costs itself, given the existing market convention that interest accrues at one day intervals. The possibility that this convention might change cannot be ruled out, in which case the Bank likely would move in the same direction. However, it is not something that the Bank currently wishes to promote. While provision of intra-day liquidity will be unconstrained by price, there are no concerns about monetary policy being undermined, given the requirement that intra-day repos must be repurchased before the end of each banking day. This requirement means that monetary policy will have the same 'bite' as now, since the factors which determine the level of supply of and demand for overnight funds in the banking system, and thus overnight as well as longer-term interest rates, will not change.[14]

Nor will the Reserve Bank be applying any credit-related fees in respect of intra-day repos.

[12] An initial step in the reform implementation was to migrate the foreign exchange settlements of some banks which previously were processed in ISL to KITS. This has been facilitated by the owners of KITS (four banks) opening the system to membership by registered banks meeting certain criteria.

[13] Payments made through the ISL and ETSL systems will continue to be settled on a net end-of-day basis. Net bilateral payments required to effect settlement will be agreed and submitted by the banks to ESAS at around 7 o'clock each morning. Up until late 1997, these inter-bank net settlements were effected on a multilateral net basis. The move from multilateral to bilateral netting will make it easier to deal effectively with the unsettled payments in these systems should a bank fail.

[14] See Tait (1995 (b)) for elaboration on these issues.

This reflects that the credit risks to the Reserve Bank arising from these transactions are minimal. First, under a repurchase agreement, the Bank would incur a risk of loss only if the issuer of the security purchased by the Bank were to fail *and* the bank from which it had been purchased were also to fail and thus could not repurchase. Secondly, the Bank will be limiting the securities eligible for intra-day repos to securities issued by the Crown or Reserve Bank itself, by registered banks, and by other issuers with a short-term credit rating of at least A1 (Standard and Poors) or P-1 (Moodys). Thirdly, there will be limits on the aggregate amount of individual issuer private securities that the Bank will be willing to hold under re-purchase agreements at any one time. These limits have been set at up to NZD200 million for bank issued securities, and up to NZD50 million for qualifying non-bank issued securities. Fourthly, the Bank will be applying a 2 percent 'haircut' when valuing securities to be purchased: that is, the amount of cash exchanged against the security (in both legs of the repurchase transaction) will be 98 percent rather than 100 percent of the market value of the security. This will provide the Bank with a buffer should a bank fail to repurchase and the securities have to be disposed of on the open market. Taken together, these factors reduce the credit risk facing the Reserve Bank to a negligible level.

It is expected that the availability of the intra-day repo facility will enable payments to flow through the system smoothly virtually all of the time. Nonetheless it is recognised that RTGS systems which require all payments to be pre-funded, conceivably, can become 'grid-locked'; that is, a configuration of queued payments can develop such that no one payment can proceed ahead of any other. To help cover this contingency, a 'freeze frame' process has been incorporated into ESAS. This process, on being invoked, will involve testing whether settling designated queued payments simultaneously would unlock the grid-lock and enable payments to flow again. If so, that group of payments would be settled simultaneously (but still with inter-bank settlement preceding interchange).

An illustration of how the payment system will operate under RTGS, again based on a bond transaction in Austraclear, is shown in box 2.

5 Some further details

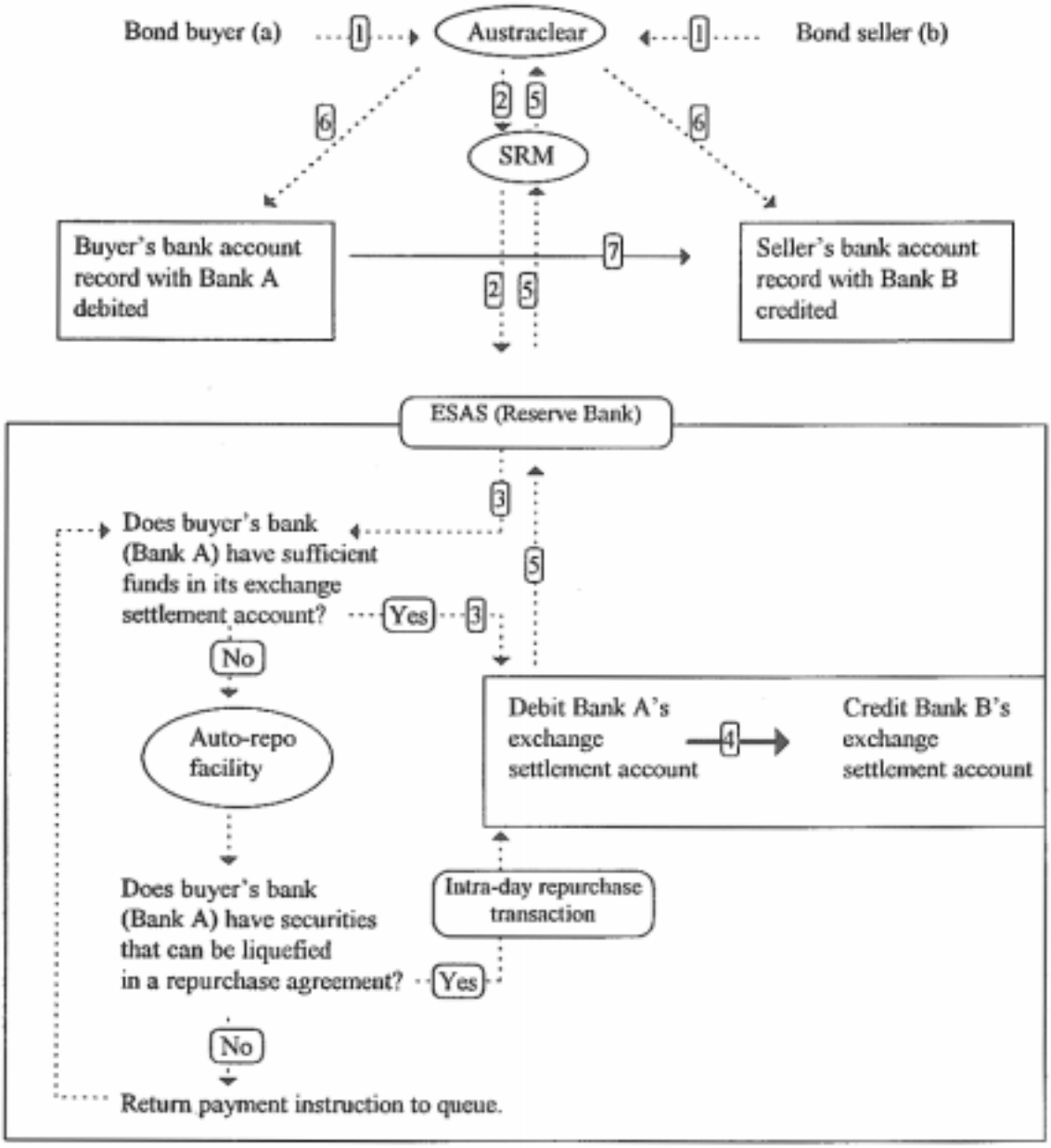
Operating hours

ESAS, which sits at the core of the new architecture for the payment system, will be available for settling transactions nearly 24 hours a day every banking day. The banking day will run from 8.40am to 8.40am the following banking day. Transactions settled between midnight and 8.40am will be dated the previous banking day (as already occurs for transactions undertaken within the inter-bank market, and with the Reserve Bank, each morning to settle up the previous day's banking business). Within the ESAS banking day, there will be an 'interim end-of-day' at 7pm, following which the system will be inaccessible for about one hour, to enable any maintenance work required on the system to be undertaken. Thereafter the system will go back on-line for the night, although it is not envisaged that large volumes of transactions, if any, will flow through overnight. From about 7am, a series of liquidity management and end-of-day settlement processes will commence. These include the entering by banks of the net bilateral settlements advised by the ISL and ETSL switches, the daily Reserve Bank 'float tender', inter-bank borrowing/lending, any end-of-day discounting, and repurchase by banks of any securities remaining outstanding under intra-day repurchase agreements.[15]

The switches will each set their own operating hours and will continue to operate essentially as they do now. Much of the processing performed by the retail, ie ISL and ETSL switches will continue to be done overnight and, as already noted, settled on ESAS early the next morning.

[15] For further details on the end-of-day liquidity management operations performed by the Reserve Bank, see Huxford and Reddell (1996).

Box 2 **A government security (bond) transaction under RTGS**



Key:

Payment instructions (messages) ·····→

Money flows ——→ of commercial bank deposit balances between customers

——→ of central bank deposit balances between banks

Sequence:

1. Buyer and seller enter the transaction into the Austraclear system.
   Austraclear checks that the transaction details submitted by the buyer and seller match and that the buyer has sufficient funds in its Austraclear account to make the purchase. If all details are in order …
2. Austraclear sends a message to SRM, and SRM to ESAS, requesting inter-bank settlement.
3. ESAS seeks confirmation that the buyer's bank has sufficient funds in its exchange settlement account at the Reserve Bank and …
4. effects inter-bank settlement only after confirmation is received,
5. Following which a message is relayed back, via SRM, to the Austraclear switch advising that inter-bank settlement has taken place …
6. enabling interchange messages to be sent by Austraclear to the buyer and seller's respective banks account records, and …
7. those bank account records to be respectively debited and credited.

Note that interchange 7 **follows** inter-bank settlement 4

Contracts

To date important elements of the inter-bank interchange and settlement process in New Zealand have been governed by convention rather than by contract. The development of RTGS systems has however created a greater need, and the opportunity, to establish better the contractual rights and obligations of the parties involved. The relevance of this aspect of the overall project will be evident when it is borne in mind that a large part of the motivation for introducing RTGS has been better to ensure that uncertainty and disruption in the payment system would be minimised should a bank fail. This requires that rights and obligations be clearly established ahead of the failure occurring.

More generally, the RTGS project has included some development of the 'governance' arrangements for the payment system; for example, codes of conduct to govern the behaviour of the participants, and provisions that establish pricing structures for the services they provide to their members.

In the case of the Reserve Bank, two issues arose under this heading: the contractual terms and conditions to apply to exchange settlement accounts and to the use of ESAS; and the criteria for granting by the Bank of an exchange settlement account.

Whereas previously there was no formal single contract governing the operation of an exchange settlement account, there is now a comprehensive contract, which covers the terms and conditions of the account itself and the service performance obligations of the parties. These contracts are broadly of the nature of a 'banker-customer' contract, between the Reserve Bank and the exchange settlement account holder. They are individual, bilateral, contracts between each account holder and the Bank, but given that inter-bank payment interchange and settlement is necessarily an industry-wide co-operative activity, and that there is an element of public policy interest, the contracts will be publicly available.

The key provisions of the ESAS contract entered into be the Reserve Bank and each settlement account holder include that:

- the Reserve Bank will act on instructions given in accordance with the terms and conditions of the account holder, and transactions once posted to exchange settlement accounts will be final and irrevocable. (Thus any payments made on the basis of an instruction given in error by the paying bank will need to be corrected by a new transaction, not by the original one being reversed.)

- ESAS will operate on a cost recovery rather than 'commercial' basis, with the operation and capital costs to be recovered through transaction fees;

- the Reserve Bank is required to consult with and take due account of the views of account holders on matters concerning the operation and development of ESAS.

There is also a contract under which intra-day repos are transacted. This contract is modelled on the one used by the Reserve Bank in its inter-day operations. It is a separate contract from that which governs ESAS itself, and it does not necessarily follow that every ESAS user automatically will be eligible to enter into intra-day repos with the Reserve Bank.

Another issue has concerned the criteria for access to ESAS, and hence eligibility for an exchange settlement account at the Reserve Bank. To date these accounts have been provided only to registered banks, which in part reflects the historical central role of registered banks in the payment system, and in part a reluctance by the Reserve Bank to widen access before the lower risk environment made possible by RTGS was in place. The situation in future, with RTGS in place, will be different, but the Bank has undertaken to consult existing account holders before making any decision on whether to allow other than registered banks to hold settlement accounts.

Disaster recovery

As will be apparent from box 2, RTGS introduces a new level of technological sophistication to inter-bank settlement in the New Zealand payment system. A corollary is that it places an even larger premium on having in place robust and effective back-up arrangements should a disabling event occur. As systems become more sophisticated and automated, it becomes less easy to maintain operations following a disaster by resorting to ad hoc and manual operations.

Careful attention has been given to incorporating robust back-up arrangements during the RTGS design stages, and this is an area that will be the subject of on-going enhancement and testing. The basic goal is that the payment system should be capable, to the greatest degree possible, of continuing to operate uninterrupted should a 'disaster' disable one or more of its components. In this context, a disaster can range from a computer hardware failure; for example, failure of the computer on which ESAS is run; through a digger damaging the telecommunications cables that run into the Reserve Bank building, to a major regional disaster such as a large earthquake centred on Wellington. As discussed in the December 1997 *Reserve Bank Bulletin*,[16] a capacity to maintain an ability to make payments, both domestically and internationally, is important under all these scenarios. While in a 'major earthquake' scenario it may not be the highest priority in the area directly affected, it remains important that a regional disaster should not disable the NZD payment system nationally, or internationally, that is, for settling foreign exchange transactions. Accordingly, significant redundancy has been built into the RTGS systems: ESAS, SRM, KITS and Austraclear all have one or more levels of back up, including off-site.

6 Future developments

The introduction of real time gross settlement for wholesale market transactions – that is for foreign exchange and securities market transactions – in New Zealand represents major change to the New Zealand payment system. Having said that, for users of the payment system outside of participants in the wholesale financial markets, there will be little, if any, evidence of change. Payments made by cheque, direct debit, direct credit, telephone banking and internet banking will be largely unaffected.

Two developments in the area of these 'retail' payment systems will, however, follow.

First, the banking industry is currently developing a new payment service, under which same day cleared payment will be available to customers. This electronic payment service will use SWIFT[17] to link the banks to each other and to SRM, and will operate on an RTGS basis. It is envisaged that it will complement existing wholesale market payment systems and also provide a useful service to those outside of the wholesale markets who, from time to time, wish to be able to make payment in a form that is undoubted. An example would be in property transactions, where the payee wishes to be assured of receiving undoubted funds before releasing title. The same day cleared funds facility will enable this to be achieved. It will be an advance on bank cheques, in that payments made will be legally final and irrevocable. Bank cheques, by contrast, can, in limited circumstances, be dishonoured, and, of course, are subject to the risk that the issuing bank may fail. In effect, the same day cleared funds service will offer to banks' customers an ability to make high value payments in Reserve Bank 'cash', something that currently is not possible other than by using bundles of bank notes.

[16] See White (1997).

The second development envisaged is the establishment of robust 'failure to settle' rules for those switches which will continue to submit payments for settlement on a net, deferred, basis. It is too early to say what form those rules might take, other than that it is likely that they will involve elements of inter-bank netting of gross payments and the development of legally-binding rules to govern which payments are reversible, and for those deemed not to be reversible, the allocation between the paying and receiving banks of any losses that may be involved in a bank failure situation.[18] One of the reasons for addressing this area only after RTGS (including AVPS) has commenced operation is to enable the magnitude of the remaining payments and risks in the systems concerned to be observed. It is already clear that once Austraclear and KITS commence operating in RTGS mode, the greatest part of the systemic risk currently embedded in the payment system will be removed. And the coming on stream of AVPS (expected to occur in the first half of calendar 1998) will likely see some further high value payments migrate to RTGS. If this leaves deferred net settlement switches handling mainly low value payments, devising a set of failure to settle rules for these switches which adequately balance the Reserve Bank's systemic risk reduction objectives, and the interests of the banking industry and its customers, will be significantly assisted.

Another future development will be in the area of the settlement of foreign exchange transactions. These transactions involve payments in more than one currency, on different payment systems in different countries. For example, a NZD/USD transaction involves a NZD payment from one party to the other in New Zealand and a USD payment in the opposite direction in the United States. Even if both individual payments are made on RTGS systems,[19] there remains a settlement risk because international time differences mean that the respective payments will be made at different times. Given that New Zealand is 17 hours ahead of the East Coast of the United States, where the USD settlement system (CHIPS) is located, the NZD payment is made ahead of the reciprocal USD payment. This results in the party receiving USD carrying an exposure on the party receiving NZD. Given the volume of foreign exchange business that occur these days, these risks can also be extremely large, and again can be of systemically threatening dimensions. The issue is attracting increasing attention internationally, and is an area in which New Zealand is taking a keen interest.[20]

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[17] SWIFT (Society for Worldwide Interbank Financial Telecommunication) is a system mainly used by banks for sending payments messages to correspondent banks to settle foreign exchange transactions. It is expected that customer access to the same day cleared payment service itself will be by personal computer banking links.

[18] One model is that developed for the CHIPS system in the US, which was referred to in section 2 above.

[19] Strictly speaking this is not the case, since the CHIPS system in the US, on which payments made to settle the USD leg of foreign exchange transactions are made is a net deferred settlement system, albeit one which incorporates strong risk reduction features.

[20] For a fuller discussion of the settlement risks involved in settling foreign exchange transactions, see Harrison (1997). Also see Apatu (1996) for details on foreign exchange transaction turnover levels in New Zealand.

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