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The implementation of monetary policy and the efficiency of the money markets

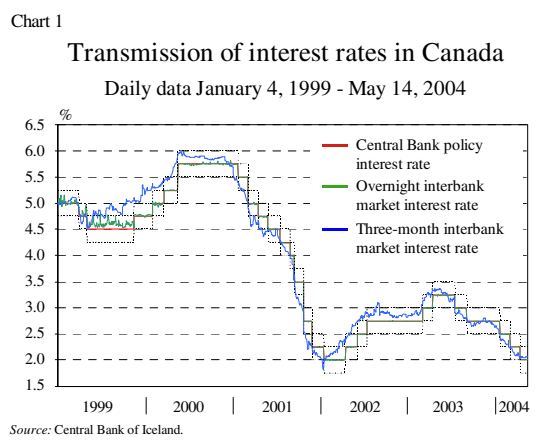
In recent years the deviation between central bank policy interest rates and short-term money market rates has been much larger in Iceland than in most other countries. This article explores the causes and the options available to the Central Bank of Iceland for reducing the gap between short-term rates and its policy rate. It discusses monetary policy implementation in other countries, focusing on the impact of the electronic payment systems that they have introduced in recent years. Proposals are also suggested for changes in monetary policy implementation and measures to enhance the efficiency of the financial system.

Since March 1998 the Central Bank of Iceland's main instrument has been the interest rate on its repos with credit institutions. Until spring 2001 the Bank used this rate to maintain the exchange rate of the króna within its deviation band. After moving on to an inflation target that spring, the Bank has applied its policy rate towards maintaining the target. Changes in the Central Bank policy rate are transmitted to the economy through the financial markets. The policy rate affects other money market rates, which in turn impact the exchange rate of the króna, asset prices and bank lending. These aggregates ultimately affect demand in the economy, inflation expectations and the rate of inflation. The transmis-

sion mechanism of monetary policy is described in Pétursson (2001).

An important element in the transmission mechanism of monetary policy is the relation between the Central Bank policy rate and other short-term money market rates. In other countries, short-term money market rates track Central Bank rates extremely closely. Chart 1 clearly shows that overnight rates in Canada have been virtually identical to the Bank of Canada's key policy rate for almost every single day

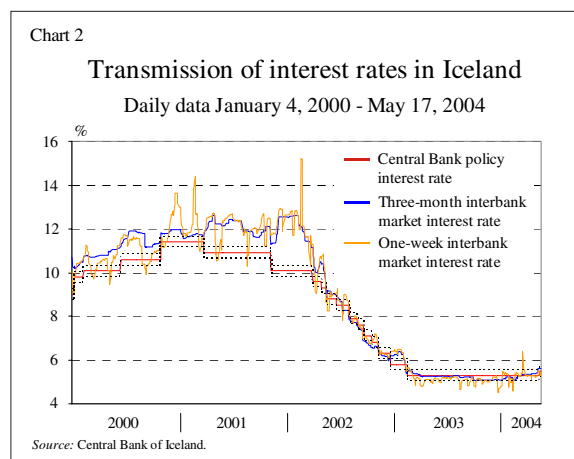
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since the beginning of 2000. Before that time, overnight rates were marginally higher than the policy rate, but never by more than 25 basis points (0.25%). Chart 1 also shows that three-month interbank market rates in Canada track the key policy rate closely, rarely deviating by more than 50 basis points.

The short-term correlation between the central bank policy rate and other short-term interest rates is much weaker in Iceland than in most other countries. Chart 2 shows the development of one-week and three-month interbank market rates.² In 2000 and 2001, interbank rates remained much higher than the policy rate for months on end. The deviation was most pronounced towards the end of 2001, at more than 200 basis points between one-week interbank rates and the Central Bank policy rate. Although the gap has narrowed considerably since then, it is still much greater than is the norm elsewhere. Thus one-week rates were 50 basis points above the policy rate at the beginning of 2003, then dropped below it and remained 25 basis points lower for most of 2003. Chart 2 also shows that three-month rates appear to follow short-term interbank rates and not the policy rate.

Deviations between interbank rates and the policy rate have at least two adverse effects. First, they



2. Until June 1, 2004, the Central Bank of Iceland's policy interest rate was the 14-day repo rate, which would be preferable for this comparison. However, an interbank market for 14-day loans has only been operative since January 2001. Thus 14-day rates are not available for the entire period shown in Chart 2. Since January 2001, however, 14-day rates have tracked the one-week rates very closely.

weaken the monetary policy transmission mechanism and introduce an unnecessary element of uncertainty to it. Monetary policy is based on the Central Bank managing interest rates in Iceland's financial markets. The more control that the Central Bank has over interest rate levels, the easier it is for it to manage demand in the economy and attain its inflation target.

Second, a mismatch between interbank rates and the Central Bank's policy rate indicates inefficiencies in the financial system. Such a mismatch means that Icelandic banks finance themselves on different terms. Some raise finance through repo transactions with the Central Bank, but others in the interbank market at completely different rates. This is a sign of flaws in the interbank market as an intermediary between the banks that have excess liquidity and those that can make the best use of it. Given that one role of the Central Bank is to promote an active and efficient financial system, it should preferably do everything in its power to make the interbank market as efficient as possible.

In recent years, major changes have taken place in monetary policy implementation by central banks in many countries. Reserve requirements have been reduced or even abolished and the importance of open market operations has diminished. Sophisticated real-time electronic payment systems have been introduced which now play a key role in monetary policy implementation.

These reforms are a response to the increased importance of electronic transactions and less demand for base money. For a long time, central banks influenced interest rates through open market operations that adjusted the amount of base money.³ In order to lower interest rates, the central bank sold base money in the interbank market in exchange for other assets such as bonds. Increased supply of base money brought interest rates down. To raise interest rates, the opposite applied. The Central Bank bought money in exchange for other assets. The lower supply of base money caused interest rates to rise.

Rapid technological advances in the financial markets have increasingly enabled banks to transfer capital from assets that are subject to reserve requirements, to others that are not. In addition, the role of

3. Base money is defined as notes and coin in circulation, plus cash and deposit money banks' deposits with the Central Bank.

notes and coin has declined significantly. As a result of this development, the banks' demand for base money has been decreasing. Many economists have voiced concerns that this trend may weaken the central banks' control over short-term interest rates until they lose all control when demand for money dries up entirely (see Friedman, 1999).

Others have pointed out, however, that monetary policy implementation can be changed to avoid this problem. More to the point, several central banks have already put such systems into effect. The Bank of Canada, the Reserve Bank of Australia and the Reserve Bank of New Zealand have adopted systems that enable them to have full management of short-term interest rates (see Chart 1) despite conducting virtually no open market operations and despite having abolished reserve requirements, thereby causing demand for base money to plunge.

Electronic payment systems and the implementation of monetary policy

Monetary policy implementation in Canada, New Zealand and Australia differs in many ways from most standard textbook models.⁴ In textbook models, the key difference between money and other assets is that (base) money is a non-interest bearing asset. Money is in demand because it facilitates transactions. Technological innovations in financial markets today enable the use of all kinds of interest-bearing assets to facilitate transactions, drastically eroding demand for money. The Bank of Canada has responded by paying interest on monetary deposits in the payment system. Another key feature of textbook monetary models is that central banks influence interest rates with open market operations. However, the Bank of Canada conducts virtually no open market operations.⁵ Instead, it keeps the volume of base money in its Large Value Transfer System (LVTS) constant.⁶ Thus textbook accounts clearly cannot be

relied on for descriptions of monetary policy implementation in Canada. Instead, the system is described in full below.

The LVTS plays a key role in Canadian monetary policy implementation. In effect, the Bank of Canada influences interbank interest rates by controlling deposit and lending rates in the LVTS. In order to understand the relationship between interbank rates and LVTS rates, and how the Bank of Canada can exert a full influence over interbank rates without conducting open market operations, let us look more closely at the way the LVTS functions.

Broadly speaking, banks have current accounts in the LVTS and all large-scale interbank payments are made there. An example will clarify this process. Suppose that Alcan would like to pay Air Canada \$50 million for airfares and other services. Suppose also that Alcan is a client of Bank of Montreal and Air Canada is a client of Royal Bank of Canada (RBC). Suppose, for simplicity, that the positions of all banks in the LVTS are zero before this payment is made. The payment is then made in the following manner (see Chart 3): First, Alcan contacts Bank of Montreal and asks it to make this payment. Bank of Montreal debits Alcan's account by \$50 million and contacts RBC. Bank of Montreal asks RBC to credit Air Canada's account with \$50 million in exchange for Bank of Montreal crediting RBC's account in the LVTS with \$50 million. Bank of Montreal then contacts the LVTS and asks it to credit the account of RBC with \$50 million in exchange for debiting the account of Bank of Montreal by the same amount.⁷

At the end of all these exchanges, the payment has cleared and Air Canada has been paid. More important from the point of view of the LVTS is that Bank of Montreal's balance has turned negative while RBC's balance is positive. Under the LVTS rules, banks that end the day with a negative balance in it must borrow this amount overnight from the Bank of Canada at an interest rate called the Bank Rate. Banks that end the day with a positive balance in the LVTS receive the overnight deposit rate, which

4. Monetary policy implementation in Canada, New Zealand and Australia is very similar. The remainder of this article will discuss implementation in Canada, although most of it applies to all three countries.

5. The small open market operations conducted by the bank are of a technical nature. These will be discussed separately below.

6. "Base money in the LVTS" refers here to base money less notes and coin.

7. Notice that this transaction is not described in the traditional terms of money being withdrawn from one account and deposited into another account. That terminology is unfortunate since it may imply that money in paper form is changing hands. Such a view can lead to confusion in the context of payments clearing in an electronic payment system in which no paper money exists, only credits and debits.

is the Bank Rate less 50 basis points, as determined by the Bank of Canada.⁸

Chart 3
Example of payment

Alcan		Air Canada	
Assets	Liabilities	Assets	Liabilities
-\$50 m. in deposits		+\$50 m. in deposits	
Bank of Montreal		Royal Bank of Canada	
Assets	Liabilities	Assets	Liabilities
-\$50 m. on LVTS account	-\$50 m. deposit by Alcan	+\$50 m. on LVTS account	+\$50 m. deposit by Air Canada

Suppose that the Bank of Canada's lending rate is 6%, which would make its deposit rate 5.5%. Bank of Montreal will want to pay a lower interest rate than 6% on its \$50 million dollar negative balance in the payment system. RBC, however, will want a higher rate than 5.5% on its \$20 million positive balance in the payment system. These two banks therefore have an obvious incentive to transact in the interbank market before the close of the day at some interest rate between the lending rate and the deposit rate of the Bank of Canada. For example, if RBC lends the Bank of Montreal \$50 million overnight at 5.75%, both banks gain 25 basis points. More to the point, both banks again have a zero position within the LVTS.

Two aspects of this example need to be underlined. First, it shows that the deposit and lending rates in the payment system form a floor and ceiling for interbank rates. Banks that are short on liquidity will not offer to pay higher interest than the payment system lending rates available to them at the central bank. Because banks with excess liquidity are assured of earning the payment system deposit rate, they will not agree to lend for less. Since the interbank rate is strictly in between the lending and deposit rates of the LVTS, all banks have an incentive to adjust their balances for payment flows by trading

in the interbank market. They do so in order to end the business day with a zero position in the payment system, to avoid borrowing from the central bank or leaving funds deposited with it. Thus the system ensures the functionality of the interbank market and also that rates there are maintained between the payment system deposit and lending rates.

Second, the example shows that typical transactions within the payment system leave the aggregate balance within it unaltered. If one bank has a positive balance on any given day because its customers have paid less than they have been paid, other banks in the system will have a corresponding negative position.⁹ Only two types of transaction alter the aggregate balance of the banking system in the payment system. When public demand for notes and coin changes, e.g. over Christmas, banks need to purchase these from the central bank. Banks pay for the notes and coin by reducing their deposits in the payment system. Such payments therefore change the volume of base money in the payment system.

The Treasury is in a unique position insofar as the central bank serves as its banker. Consequently, Treasury payments affect the aggregate balance in the payment system. Take a simple example: The government would like to pay Air Canada \$20 million for airfares. The Bank of Canada then credits RBC with \$20 million, and RBC credits Air Canada's account with \$20 million. This transaction thereby increases the banking sector's aggregate balance in the payment system by \$20 million.

As pointed out above, all banks in the payment system have an incentive to end the day with a zero position. However, this is only possible if the net position (aggregate balance) in the system is zero. A negative balance in the system would leave some banks with a negative position at the end of the day, but none with a positive balance. The banks with a

8. A detailed description of the LVTS is given on the Bank of Canada website, www.bankofcanada.ca.

9. The reader may wonder how total bank lending could ever increase in such a system. The flaw there is to assume that the bank needs to be in possession of the funds that are lent when the loan is granted. This is a misunderstanding, at least after the reserve requirement has been abolished. If Bank of Montreal agrees to lend Alcan \$200 million, the process is as follows: Bank of Montreal raises the deposit in Alcan's account by \$200 million (an entry that appears on the liability side of Bank of Montreal's balance sheet) and also records a debt of \$200 million owed to it by Alcan (an entry that appears on the asset side of Bank of Montreal's balance sheet). In a certain sense, money is therefore created by this transaction.

negative position then begin bidding increasingly higher interbank rates until these are as high as the overnight rates. A positive position in the system, on the other hand, exerts downward pressure on interbank rates until they equal the deposit rate for payment system accounts.

The Bank of Canada has succeeded in preventing fluctuations in the interbank rate by actively managing the aggregate balance in the LVTS on a daily basis so as to keep it constant at zero. It does so with open market operations to neutralise the net impact of public sector flows (such as the Treasury payment in the example above) and fluctuations in demand for notes and coin on the banking sector's aggregate balance in the LVTS.¹⁰

As Chart 1 shows, the Bank of Canada has been incredibly successful in managing short-term interbank rates after it adopted the system described here at the beginning of 1999. Since the beginning of 2000, interbank rates have never approached the LVTS deposit or lending rates; on the contrary, they have remained very close to the midpoint between them, which is the Bank's target. This means that the Bank of Canada has never needed to make adjustments to the aggregate balance in the LVTS in order to keep interest rates where it wants them. What seems most surprising is that when the Bank of Canada changes its key policy rate, the interbank rates jump straight to a new equilibrium the same day without the Bank of Canada conducting any special open market operations. However, there is actually nothing strange about this. The banks have an incentive to achieve a zero position by trading in the interbank market at rates between the payment system deposit and lending rates. Indeed, it can be argued that they have an incentive to conduct this trading midway between the deposit and lending rates, see Woodford (2001). When these rates move, the interest rate level at which the banks have an incentive to trade moves as well.

10. Initially, the Bank of Canada kept the aggregate balance of the banking sector in the LVTS constant at zero. However, it transpired that the zero target led to slight upward pressure on the interbank interest rate, generally leaving it a couple of basis points above the spread between the LVTS deposit and lending rate. For technical reasons the banks seek to end the day with a low positive balance. Since April 2001 the Bank of Canada has kept base money in the LVTS fixed at \$50 million, which has worked better. See Chart 1.

As pointed out earlier, the reserve banks of Australia and New Zealand conduct their monetary policy along the same lines as the Bank of Canada. Monetary policy implementation in Sweden and the euro area is also based on broadly the same system, although the practicalities are slightly different. The main difference is that instead of managing the overnight rate and conducting open market operations on a daily basis, the ECB and Riksbank employ one-week interest rates and conduct their open market operations with a weekly auction of one-week repos. Broadly speaking, the payment systems in the euro area and Sweden are the same. Both lend overnight to banks which end the day with a negative balance, at rates above the policy rate (50 basis points in the euro area and 75 in Sweden) and pay a deposit rate which is below the policy rate on positive balances that banks may have in the payment system overnight.

In recent years, Iceland's monetary policy implementation has been moving into line with the above-mentioned countries. More specifically, the Central Bank of Iceland has gradually been adopting a system of monetary policy implementation resembling those used by the ECB and Riksbank. Nonetheless, the Central Bank of Iceland has not been as successful as they have, or the central banks of Australia, New Zealand and Canada, in restraining fluctuations in interbank market rates and letting them follow its own policy rate. What is the reason? An attempt will be made to answer this question in the following section.

[What causes interbank rates to deviate from the Central Bank's policy rate and what can be done about it?](#)

There are probably two reasons that interbank rates do not follow the policy rate as closely in Iceland as they do elsewhere. One is that Iceland's monetary policy implementation still differs from that in the countries that lead in this field. The other is the result of a number of flaws in the general financial market framework in Iceland.

Four main aspects of monetary policy implementation in Iceland have differed in recent years from arrangements in leading countries:

Real-time gross settlement system

In recent years the payment system has become the cornerstone of monetary implementation in Canada, New Zealand, Australia, Sweden and the euro area. Iceland's own payment system has been under development at this time and is now fairly well advanced. Although shortcomings in the payment system may have contributed to the mismatch between interbank rates and the Central Bank's policy rate in recent years, they are unlikely to do so in the future.

Essentially, the payment system that has been introduced in Iceland closely resembles those used by the abovementioned countries since the second half of the 1990s. From the perspective of monetary policy implementation, the most important features of the payment system are: 1) Collateral is posted for all negative balances, so that if one member encounters difficulties, this will not gridlock payments in the system. 2) The Central Bank determines the deposit and lending rates of the payment system. Members ending the day with a negative balance are automatically lent Central Bank funds at the payment system's lending rate. Those ending the day with a positive balance are automatically paid the overnight deposit rate. 3) At the end of each day, after the cessation of payments, members of the system are allowed time (perhaps half an hour) to trade among themselves in the interbank market in order to adjust their balances to zero so that they do not need to borrow or keep deposits overnight. One important difference between the Icelandic RTGS system and, for example, the Canadian LVTS is that the Bank of Canada guarantees all payments in the unlikely event of more than one system member experiencing difficulties. This rule, combined with the posted collateral, should ensure full security of payments.

The spread in the payment system

The spread between the Central Bank of Iceland's lending and deposit rates has been close to 500 basis points in recent years. As pointed out earlier, the deposit and lending rates in the payment system form a floor and ceiling that interbank rates do not exceed.¹¹ The huge spread in Iceland gives short-term interest rates great scope for fluctuation. In

Canada, New Zealand and Australia this spread is 50 basis points. It is 100 basis points in the euro area and 150 points in Sweden. Such a narrow spread ensures that short-term interest rates never move far from the policy rate set by these countries' central banks. Furthermore, as a result of effective short-term management of the aggregate balance in these countries' payment systems, short-term rates remain close to the midpoint of the range, thus preventing the banks from seeking short-term central bank funding that is significantly in excess of their reserve requirements.

Besides giving interbank rates ample scope for fluctuation, the wide spread in the Icelandic payment system leads to a much wider spread between bids and offers in the interbank market compared with the norm in other countries. In general the spread on one-week bids and offers in the Icelandic interbank market is in the range 25-40 basis points. Elsewhere it measures only a handful of points, and in some cases even 0-1. Iceland's wide spread is caused by the risk that, at the end of the reserve requirement maintenance period, a bank may need to borrow or maintain deposits overnight with the Central Bank if it is short or long in the payment system.¹² Such a wide divergence in the overnight deposit and lending rates from the Central Bank's policy rate means that this risk is high. Banks demand sizeable premia on interbank trading which exposes them to such risk.

Substantially narrowing the spread between overnight lending and deposit rates would be an important step in bringing interbank rates closer into line with the policy rate. It would also be important for enhancing efficiency in the interbank market, by narrowing the spread between bids and offers.

Short-term management of the aggregate balance in the payment system

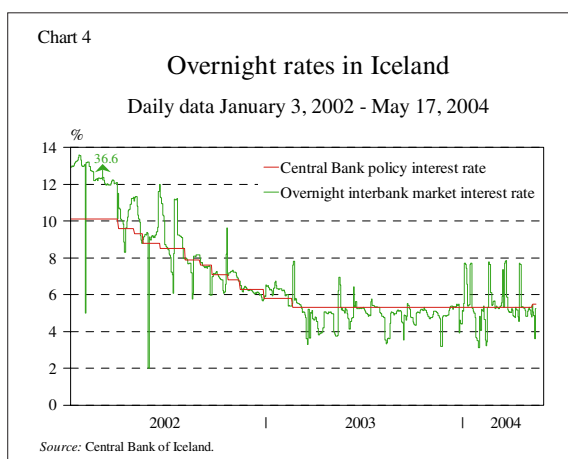
Changes in short-term management of the aggregate balance in the payment system are another key factor in matching interbank rates more closely to the Central Bank's policy rate. Today, the Central Bank conducts weekly auctions of one-week repos. Between these weekly open market operations,

11. Interbank rates in Iceland have gone beyond the corridor of overnight deposit and lending rates. The causes will be discussed below.

12. At other times than the end of the maintenance period, a bank can allow its required reserve deposit to fluctuate from the average figure where it is supposed to lie.

changes in the aggregate balance in the payment system – caused by Treasury flows, reserve requirements and demand for notes and cash – make interbank rates fluctuate within the week, particularly when such changes occur just before the end of the reserve requirement maintenance period.

Two approaches can be used to resolve this problem: 1) *The Swedish approach*: The Riksbank no longer handles Treasury payments. Instead, the Swedish central government is a customer of commercial banks. The Riksbank has also abolished reserve requirements. In combination, these factors lead to much smaller changes in the aggregate balance within the week, with a corresponding softening of fluctuations in interbank rates. 2) *The approach of Canada, Australia and New Zealand*: In Canada, Australia and New Zealand this problem is solved by daily central bank open market operations. The Central Bank of Iceland, for example, could offer daily overnight repos at its policy rate – or simply buy and sell instruments daily with the aim of keeping the aggregate balance in the payment system stable. There appears to be no immediate obstacle to the Central Bank continuing its weekly auctions of one-week repos even if it introduces daily overnight repos. However, the introduction of daily auctions would sharply reduce the importance of the weekly ones.



Reserve requirement

In recent years the leading countries in monetary policy implementation have either abolished reserve requirements or begun paying interest on them which

is comparable to interbank rates. The Central Bank of Iceland has not gone so far in reforming its reserve requirements. Nonetheless, it has changed rules on reserve requirements significantly with the aim of reducing the inefficiencies that they cause the banking system. Reserve requirements have been trimmed back and the Central Bank has begun paying interest on required reserve accounts, although these are still lower than its policy rate at any given time.

In effect the spread between required reserve accounts and the policy rate is the premium that banks pay the Central Bank for its services to the financial system. As described above, central banks no longer use required reserves to influence lending growth in the banking system. The sole role of required reserves today is as a source of income for the Central Bank. Raising the required reserve deposit rate would have a negative impact on the Central Bank's profitability. In other countries this is irrelevant, because central bank income in larger economies is much greater than operating costs, even when there is no reserve requirement. The Central Bank of Iceland's other sources of income are much smaller, due to the small size of the Icelandic economy.¹³ Hence it is not as easy for the Central Bank of Iceland to abolish required reserves or raise its required reserve deposit rate to parity with the policy rate. A precondition for such measures is that they do not jeopardise the Bank's financial independence.

The drawback to a reserve requirement is that it causes fluctuations in short-term interbank rates just before the end of the maintenance period (see Chart 3). This problem can be avoided with better short-term management of balances along the lines discussed above, and also by narrowing the spread between payment system borrowing and lending rates. Nonetheless, the reserve requirement played no part in the pronounced mismatch between interbank rates and the policy rate which developed in 2000 and 2001.

13. The Central Bank of Iceland's two main sources of income are proceeds from the issue of notes and coin, and returns on investment of the Bank's capital. Proceeds from note and coin issues are insubstantial in Iceland because of the small size of the economy. Income on the Bank's investments is much greater.

Iceland's monetary policy implementation arrangements are not the sole cause of the mismatch between the interbank rate and policy rate. A distinguishing feature of Iceland's financial market is its very few participants. This can result in oligopolistic behaviour and other problems arising from the small size of the market, hindering it from functioning as well as those in other countries. Four explanations are often given for the mismatch between interbank rates and the policy rate: 1) A bank with tight liquidity likewise lacks the collateral to be eligible for Central Bank repos. 2) A bank will not engage in repo transactions with others, since these inform the counterparty about its exposure in certain securities and the counterparty may take advantage of this in its own trading with them. 3) The banks' unsecured credit lines with each other are too low to fulfil demand. 4) The banking sector as a whole lacks eligible securities for use in Central Bank repos.

These problems are far from insurmountable. In all probability, three tweaks to Iceland's financial market arrangements would remove them:

Interbank repos and the Iceland Stock Exchange transaction fee

Shortage of eligible collateral by one bank should not be a problem, since that bank can acquire assets through repos with other banks.¹⁴ Nor should the bank's low unsecured credit lines with each other be a problem. Instead of unsecured lending to each other, the banks ought to be able to conduct repo transactions with each other. Such transactions are in effect the equivalent of secured loans, but with the advantage of being easier to arrange. Icelandic banks should be able to solve the majority of problems that have plagued their financial management in recent years through repo transactions with each other and with other Icelandic financial institutions.

14. A crucial point here is that commercial banks can post all kinds of assets as collateral in repos with each other, even those that the Central Bank does not define as eligible. The Central Bank's definition of eligible collateral is very narrow. Only Treasury bonds, Treasury-guaranteed bonds, housing bonds and corporate bonds from issuers with an international credit rating are accepted as collateral by the Central Bank. Consequently, for example, bank A, which owns stocks but an insufficient amount of securities that are eligible as collateral for Central Bank transactions, can conduct a repo with bank B, which has plenty of them.

On first impression it is extremely strange that Icelandic financial institutions should not conduct repos with each other on a larger scale. But a closer examination reveals that a number of flaws in Iceland's financial market organisation prevent them from conducting repos with each other to the extent that they should.

The most serious obstacle to interbank repos is the fee that banks have to pay Iceland Stock Exchange (ICEX) for such transactions. ISE charges a fee for trading with securities other than equities amounting to 0.0045% of the trade amount. In repos, both the buyer and the seller need to pay this sum twice, since a repurchase is in effect a double trade. This low percentage is not an obstacle to portfolio trading. However, it is a major hindrance in overnight repo trading of the kind that banks would need to conduct as part of their short-term liquidity management. Gains on such trading are only a fraction of the total trade amount, because of their very short-term nature. Thus the ICEX fee can mean that such trades are not worth the costs they entail, severely complicating the banks' short-term liquidity management.

Let us consider a simple example. Since 2003 the Central Bank has offered the banks 14-day certificates of deposit (7-day since June 1, 2004) at a rate generally 20 basis points below the repo rate. In April 2004 bank A bought CDs on average for 10 b.kr. at an interest rate of 5.1% while bank B conducted repos at 5.3% for much higher amounts. Both these banks could have gained by trading with each other at an interest rate in the range 5.1-5.3%. They would have gained roughly 400 thousand krónur for each 14-day period (based on a trading rate of 5.2% with insubstantial transaction costs). ICEX's total fee for the trade, however, would have been 1.8 m.kr. Thus the cost of the transaction would be several times greater than the profit on it.

The fact that ICEX's transaction fee makes it unprofitable for banks to eliminate a spread of tens of basis points plays a large part in the mismatch between interbank rates and the Central Bank's policy rate. Cutting the ICEX fee to one-hundredth or one-thousandth of its present level in the case of short-term repos is an important step towards improving cash management within the banking sector and levelling out the mismatch between the interbank rate and policy rate.

Repos with pension funds

In 2000 and 2001 the banking sector as a whole was sometimes apparently short of eligible collateral. Short-term interbank rates occasionally rose beyond Central Bank overnight rates, even though all banks with eligible securities had the opportunity of funding through Central Bank overnight facilities. Such a situation indicates serious inefficiencies in liquidity management in the Icelandic financial markets. Eligible collateral was always in ample supply. Banks lacking eligible collateral should, for example, have been able to procure assets through repos with pension funds, which held large portfolios.

It was not only the ICEX fee that prevented more trading. In part a repo is a forward contract, with an agreement made about the second half of the transaction when the first is concluded. Pension funds are prohibited by law from forwards trading except as a hedge – for example, to hedge against the inherent exchange-rate risks in their foreign equity portfolios. Normally, however, they may not conduct repos with banks in need of eligible collateral, since such trades do not as a rule provide a hedge, but would be simply aimed at profiting from the banks' need for assets to use as collateral.

The justification for the general ban on forwards trading by pension funds is that they often entail large risks that are difficult for outsiders to appreciate. However, this probably does not apply to short-term repos with the banks. Carrying very low risk, they should represent a desirable way for pension funds to squeeze out a marginal but economical extra return (i.e. without entailing too high a risk). In addition, freedom for pension funds to conduct repos with banks is important for the whole financial sector. Allowing them to do so would give the financial system access to a far greater stock of assets that are eligible for use as collateral. Insofar as the lack of eligible collateral is an impediment to the Icelandic financial sector, such authorisation would enhance its efficiency.

Anonymous interbank repos

Another obstacle to interbank repos is the banks' unwillingness to inform others about their holdings in individual classes of securities.¹⁵ The other banks'

15. Under a repo, A sells B securities in exchange for cash (or other securities) and agrees at the same time to repurchase the same securities

knowledge leaves a bank at a disadvantage when it conducts other types of trading with such securities.

Banks should be able to solve this problem by conducting repos with securities that they have obtained in repos with other banks. If the banks were to do this on a large enough scale, bank A could not conclude that bank B owned certain securities that bank A uses in repos. It would be just as likely to have obtained them in a repo with another bank.

The disadvantage of this solution, however, is that the banks would have to conduct extensive trading for the sole purpose of concealing which securities they actually owned. This drawback could be avoided by establishing a formal blind market where banks could conduct anonymous repos with each other. Establishing such a market is probably the best way to ensure that banks do not shy away from repo transactions with each other.

Conclusion

Much greater deviations occur between interbank market rates and the central bank policy rate in Iceland than in the countries that are most successful in implementing their monetary policy. There are two causes. One is that monetary policy implementation in Iceland still differs from that in the leading countries. The other is that some flaws still remain in the organisation of Icelandic financial markets.

Several points have been identified that could easily be improved and, in combination, would probably lead to a significantly narrower spread between interbank rates and the policy rate, or eliminate it completely, without the banks having to step up their funding from the Central Bank. First, the spread between Central Bank overnight lending and deposit rates needs to be narrowed. Today it stands at 450 basis points. It would be desirable to reduce the spread to 50-150 basis points. Second, the Central Bank needs to improve its short-term management of aggregate balances in the payment system. Two ways of achieving this are identified. The simplest approach would be for the Central Bank to conduct daily open market operations. The other approach is to engineer a substantial reduction in fluctuations in

from B at a specified date. After the transaction, B therefore knows that A holds these specific securities.

base money by transferring Treasury transactions to commercial banks and abolishing reserve requirements. Third, ICEX needs to reduce its fee for repo transactions to between one-hundredth and one-thousandth of its current level. This would enable banks to conduct short-term repos with each other, greatly facilitating their short-term cash management. Fourth, legislation should be amended to allow pension funds to conduct short-term repos with banks. Fifth, a formal market needs to be established where banks can conduct anonymous repos with each other.

Chart 2 shows that, since May 2002, interbank rates have tracked the Central Bank's policy rate much more closely than they did during the economic upswing of 2000 and 2001. This might invite the conclusion that large-scale deviations of the inter-

bank rate from the policy rate of the Central Bank were a thing of the past. Various improvements have been made in recent years relating to the Central Bank's RTGS system and other aspects of monetary policy implementation. These changes reduce the probability of such large deviations when the system next comes under severe strain. However, the spread between interbank rates and the policy rate has remained as large as almost 100 basis points at times over the past two years. Such mismatches and the volatility that they cause in interbank interest rates leave Iceland's financial markets less efficient than they otherwise might be. The reforms suggested in this article would represent an important step towards boosting the efficiency of Iceland's financial markets.

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Appendix Monetary policy implementation: an international comparison

The central banks of most OECD countries implement their monetary policies along broadly the same lines. They differ in a number of details, however. The following is a comparison of monetary policy implementation in Australia, Canada, Norway, New Zealand, Sweden, the UK, the US, the euro area and Iceland.

The basic concept behind monetary policy implementation in all these regions is the same as that described for Canada in this article. Central bank overnight lending and deposit rates set the corridor for overnight rates. The central bank announces a policy rate which in most cases lies at the midpoint between its overnight lending and deposit rates. The central bank then conducts open market operations and offers repo transactions aimed at matching interbank rates closely to the policy rate.

Table 1 presents a summary of the main features of monetary policy implementation in these regions. Most of them use an overnight policy rate. In Iceland, the euro area and Sweden it is the seven-day rate. In

the UK, the Bank of England's 14-day repo rate serves as the policy interest rate. The central banks conduct market operations on either a daily or a weekly basis: weekly in Iceland, Sweden and the ECB, and daily in the others. The spread between overnight lending and deposit rates varies considerably from one country to the next. Excluding Iceland and the US, however, it is between 50 and 200 basis points everywhere. Most of the countries in this comparison have abolished reserve requirements, although the two largest (the US and the euro area) and the two smallest (Iceland and Norway) retain them.

These policy features affect how successful the central banks of these countries are in restraining deviations between interbank rates and their own policy rates. Another factor is the precision of their short-term management of aggregate balances in the payment system. Australia, New Zealand, Canada and Sweden have achieved the best results in this respect.

Table 1 Main features of monetary policy implementation in selected countries

<i>Country</i>	<i>Policy rate</i>	<i>Spread between payment system deposit and lending rates (basis points)</i>	<i>Frequency of open market operations</i>	<i>Reserve requirement</i>	<i>Deviations between interbank and policy rate</i>
Australia.....	O/N	50	daily	No	none
US	O/N	variable ¹	daily	Yes	stable
UK.....	14-day	200-300 ²	daily	No	stable
Canada.....	O/N	50	daily	No	none
Norway.....	O/N	200	daily	Yes	stable
New Zealand.....	O/N	50	daily	No	none
Sweden.....	7-day	150	weekly	No	none
Euro area	7-day	100	weekly	Yes	At end of maintenance periods
Iceland.....	7-day	450	weekly	Yes	Stable

1. The Federal Reserve's deposit rate is always zero, while its lending rate is 100 basis points above its policy rate.

2. The Bank of England conducts several rounds of open market operations on each business day. The first two are set at its policy interest rate. In the third round the Bank offers deposits at a rate 100 basis points lower than its policy rate, and a lending rate 100 basis points higher. In the fourth round the spread is raised to 150 basis points.