Recent developments in monetary policy operating procedures: the Korean case

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Introduction

The process of financial liberalisation gained momentum from the beginning of the 1990s when the first step of a four-stage interest rate deregulation plan was put in place in 1991. The liberalisation of interest rates had been completed by July 1997 except for those on products having the characteristic of pure demand deposits. At the same time the opening of financial markets and the liberalisation of the foreign exchange market were further accelerated after Korea's admission to the OECD in late 1996. The currency crisis in late 1997 further boosted the pace of financial market opening and foreign exchange liberalisation. Actions taken in response included the opening of both the capital and money markets and the shift to a floating exchange rate system. All these measures have contributed towards a more efficient allocation of resources and have helped create a more competitive economic environment.

In addition, various reform measures were put in place in the financial markets in which the Bank of Korea's open market operations are carried out. Among them, measures taken to revamp the structure of the call market are particularly important. The Bank of Korea has done its utmost to improve the effectiveness of monetary operations: measures have been taken to enhance the effectiveness of monetary policy instruments, elaborate market-based operations and streamline the payment and settlement system. At the same time the Bank has used the overnight call rate as its operational target in addition to bank reserves in implementing its daily operations since December 1997.

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Details of recent changes in the financial environment are provided in Section 1. Section 2 explains the measures taken to improve the effectiveness of monetary policy. Section 3 describes the objectives and intermediate target of monetary policy, the operational target, monetary programming and details of the implementation of monetary operations including forecasting liquidity, the available policy instruments, and signalling and transparency. Finally, recent experiences of monetary operations and an empirical assessment of the performance of recent operations under a deregulated environment are provided in Section 4.

1. Recent changes in the financial environment

Many restrictions on financial markets and foreign exchange were relaxed or abolished in order to accelerate the globalisation and internationalisation of the Korean economy from the beginning of the 1990s. Most notably, the Government and the Bank of Korea announced a four-stage interest rate deregulation plan in 1991. Deregulation went into high gear as a result of the "Blueprint for Financial Liberalisation" and "Market Opening" in July 1993 and the "Foreign Exchange Reform Plan" in December 1994. Furthermore, Korean financial liberalisation has gathered pace since Korea's OECD admission in October 1996.

The currency crisis in late 1997 that erupted just after the completion of these "scheduled" changes necessitated more intensive deregulation and liberalisation. A wide range of economic policies was challenged once Korea came under IMF supervision; the Government changed microeconomic structures, including the organisation and functions of the Bank of Korea and macroeconomic policies.

(i) Implementing interest rate deregulation

In August 1991 a four-stage interest rate deregulation plan (Table 1) was established to promote the allocation of funds through the price mechanism and strengthen the competitiveness of the domestic financial industry.

The first stage of the plan was carried out in November 1991 with the deregulation of most short-term lending rates of banks and non-bank financial institutions. Rates on most money market instruments and time

deposits with maturities of at least three years were liberalised along with coupons on corporate bonds with maturities of at least two years.

The second round of deregulation in November 1993 freed up all lending rates of banks and non-bank financial institutions except for those on loans financed by the Government or by Bank of Korea rediscounts. Rates on time deposits with maturities of at least two years and coupons on all bonds including financial debentures were also liberalised.

The third stage of deregulation was partially effected in July 1994, phasing out regulations on maturities of short-term financial instruments such as certificates of deposit (CDs), repurchase agreements (repos) and commercial paper (CP). In addition, rates on some loans supported by the Bank's rediscounts and on deposits with maturities of at least one year were freed up in December 1994. In July 1995 rates on all loans supported by the Bank of Korea were deregulated and rates on time deposits with maturities of at least six months were freed up. Furthermore, all deposit rates except those on demand deposits were liberalised in November 1995.

In July 1997 interest rates on demand deposits were liberalised and restrictions on the maturities and minimum denomination of short-term money market instruments were lifted as the fourth stage of deregulation. At the same time commercial banks were permitted to issue financial debentures and introduce money market deposit accounts (MMDAs). Accordingly, all interest rates are now liberalised except for rates on products having the characteristic of pure demand deposits such as cheque, passbook and temporary accounts.

Until December 1997, there had been a legal ceiling on interest rates of 25%. However, the mounting downward pressure on the Korean won after the currency crisis in November 1997 made the legal ceiling a binding constraint for the scope of stabilisation in the foreign exchange market. At the end of 1997, the Government raised the ceiling to 40%, lifting it completely in January 1998.

(ii) Opening of financial markets and liberalisation of foreign exchange market

Capital market opening

The opening of the domestic stock market to foreigners in January 1992 marked a new phase of capital market liberalisation. The ceiling on

overall foreign investment in any listed company was initially set at 10% and then gradually raised, with by far the largest increase being implemented after the outbreak of the currency crisis in November 1997. The net effect was to bring the ceiling to its current level of 55% in January 1998.

It was not until July 1993 that the first consolidated timetable for capital market opening was prepared with the main features of the Blueprint on Capital Market Opening being announced. These included the replacement of the previous system by a notification system for foreigners' direct investments in Korea and for Korean companies' issuance of bonds in overseas markets. In addition, foreign investment in non-guaranteed corporate bonds issued by small and medium-sized enterprises (SMEs) was allowed.

In December 1994 the Government announced the Foreign Exchange Reform Plan incorporating the previous Blueprint: capital transactions were to be liberalised in three phases, bringing the level of liberalisation up to that in most industrialised countries by 1999. Procedures for inward direct investment were streamlined and restrictions on institutional investors' outward portfolio investment were greatly eased in 1994. International organisations were authorised to issue floating rate notes denominated in won in 1995. In addition, commercial loans to SMEs were allowed.

In preparing for OECD admission, the Government decided to accelerate liberalisation in 1996. Restrictions on outward direct investment were streamlined: under this revised system, outward direct investment projects are deemed automatically approved unless applicants are notified otherwise within 15 days of their application. Furthermore, financial loans extended by non-residents, which had been strictly regulated, were allowed for large companies participating in major infrastructure projects. The ceiling on outward investment was abolished and the scope of foreign securities in which institutional investors may invest was widened to include short-term financial instruments such as CP.

In 1997 foreigners were allowed to purchase domestic beneficiary certificates for domestic stocks as well as public bonds. However, the desperate need for the country to build up foreign exchange reserves after the currency crisis gave increased momentum to domestic bond market opening. Purchases by foreigners of corporate, government and

Table 1

Deregulation of interest rates

	Lending rates	Deposit rates	Coupons
First stage (21.11.91)	– Bank overdrafts and discounts on commercial bills, excluding loans assisted by BOK rediscounts – Discounts on commercial paper and trade bills of investment and finance companies, etc. – Overdue loans	– Short-term large denomination deposit instruments such as CDs, trade bills, commercial paper and repos – Time deposits and trust products with maturities of at least three years	– Corporate bonds with maturities of at least two years
Second stage (01.11.93)	– All loans of banks and non-bank financial institutions, excluding those assisted by government funds or BOK rediscounts	– Time deposits with maturities of at least two years – Installment-type deposits with maturities of at least three years	– Corporate bonds with maturities of less than two years and all financial debentures – Monetary stabilisation bonds and all government and public bonds
Third stage (18.07.94)		– Minimum maturities of short-term marketable products shortened (from 91 days to 60 days) – Banks permitted to handle cover bills	
(01.12.94)	– Some loans assisted by BOK rediscounts such as discount of bills	– Time deposits with maturities of at least one year – Installment-type deposits with maturities of at least two years	
(24.07.95)	– All loans assisted by BOK rediscounts	– Time deposits with maturities of at least six months – Installment-type deposits with maturities of at least one year – Maturities of short-term marketable products shortened (from 60 days to 30 days)	
(20.11.95)		– Time deposits with maturities of at least one month – Installment-type deposits with maturities of at least six months	
Fourth stage (07.07.97)		– All deposits except pure demand deposits such as cheque, household cheque, passbook and temporary accounts	

public bonds, which had originally been scheduled for 1999, were liberalised in December 1997. The Government thereby abolished all restrictions on foreign investment in domestic bonds.

Furthermore, foreign investment in short-term money market instruments such as CP and CDs was permitted in February 1998. Commercial loans to large companies were also admitted. Moreover, friendly take-overs of Korean companies by foreign investors were allowed, although the acquisition of a majority or more than 15% of the equity of companies whose asset size is over 2 trillion won still needs approval. As a result, Korea has made great strides towards a completely open capital market system comparable to that of most industrialised countries.

Foreign exchange liberalisation

The introduction of a market-average foreign exchange rate system in 1990 was a crucial step in progress towards an advanced foreign exchange management system in Korea. Under this system, the daily basic exchange rate of the won against the US dollar, namely the market-average exchange rate, was determined by the weighted average of won/USdollar transactions conducted on the previous business day among foreign exchange banks. The daily fluctuation of the market-average exchange rate was widened from the initial 0.4% above or below the basic rate to 10% either way on 20th November 1997. The recent currency crisis spurred greater liberalisation: the daily fluctuation limit was eliminated with effect from 16th December 1997, effectively launching a floating exchange rate system.

In addition, to reduce foreign exchange risk and foster the development of the foreign exchange market, from the beginning of the 1990s the restrictions on banks' foreign exchange positions and underlying documentation requirements evidencing real demand for foreign exchange transactions were substantially relaxed.

In a related move in September 1992, the positive-list system for the management of foreign exchange was replaced by a negative-list system. Whereas under the old system all foreign exchange transactions had been prohibited in principle unless exempted by the authorities, the new system allowed all foreign exchange transactions unless specifically restricted. The foreign exchange concentration system was almost completely dismantled in February 1995.

Lowering entry barriers to the financial industry

As the liberalisation of financial markets progressed, entry barriers were gradually relaxed in consideration of competitive conditions in the markets. In banking, entry barriers were lowered at the end of the 1980s. Six new nationwide commercial banks entered the market between 1989 and 1992. As for foreign banks, 22 branches were established between 1990 and 1997. Foreign branches operating in Korea were progressively placed on an equal footing with domestic banks by lifting certain restrictions on their operations and reducing their privileges. In August 1998 there were 13 nationwide commercial banks, eight local banks and 52 foreign bank branches in Korea (Annex I).

The establishment of domestic and foreign securities companies, which had been prohibited since the 1960s, was again allowed in the 1990s. In 1991 under the Act Concerning Merger and Conversion of Financial Institutions, five investment and finance companies changed their business form to that of securities company and a new securities company started trading. As a result, there were 56 securities companies including 21 foreign securities company branches in August 1998. With the progressive broadening and deepening of the financial market, remaining entry barriers will be generally lifted.

(iii) Restructuring the financial sector

The exit of insolvent financial institutions was made easier in an attempt to strengthen the competitiveness of financial industries. In March 1997, to provide the institutional framework for the restructuring of the financial industry, the Act Concerning the Merger and Conversion of Financial Institutions was extensively revised and retitled the Act Concerning the Restructuring of Financial Institutions. The revision stipulated that, to encourage voluntary mergers between financial institutions, government measures of support for such mergers be announced in advance. It also simplified the merger process and shortened the period of time required for a merger. This Act is playing a key role in activating restructuring by merger, take-over, and purchase and assumption. Many institutions are involved in negotiations aimed at meeting Basle capital adequacy ratios and acquiring competitiveness.

The launch of the IMF programme in December 1997 provided an opportunity to reshape the microeconomic structure of the financial industry that had remained unchanged for a long time.

The independence of the central bank was strengthened by the revision of the Bank of Korea Act in December 1997 which entered into force in April 1998. The ultimate goal of monetary policy implemented by the Bank of Korea was clearly defined as price stabilisation. In the meantime the banking supervision duties of the Bank of Korea were restored to the Government. Financial supervision had been divided between many bodies including the Bank of Korea. It was consolidated with the establishment of the Financial Supervisory Commission (FSC) which covers all financial institutions.

In the face of severe financial turmoil in December 1997 the Government began to realise that panic might lead to bank runs and jeopardise the overall financial markets unless insolvent financial institutions were compelled to suspend trading or close down. From mid-December 1997 many financial institutions hit by reduced credibility started to display symptoms of insolvency in the face of huge withdrawals of deposits and difficulties in borrowing money in the call market. A sharp deterioration in the liquidity conditions of many merchant banks resulted in the compulsory suspension of trading of 14 of the 30 merchant banks in December 1997. Two securities companies and one investment and trust company were also ordered to suspend trading in the same month. In addition, the shareholders' equity of two troubled nationwide commercial banks was written down substantially and the Government recapitalised them by subscribing shares in January 1998.

The business licences of 16 merchant banks and four securities companies were revoked at the end of August 1998. Two investment and trust companies also suspended trading and their assets were acquired by the other investment and trust companies. In addition, of the 12 undercapitalised commercial banks, five suspended trading at the end of June 1998 and their business is being transferred to five commercial banks under purchase and assumption. The remaining seven under-capitalised banks were required to submit implementation plans to increase their Basle capital adequacy ratios, which will require the FSC's approval. In August 1998 two of them, both nationwide commercial banks, announced plans to merge. Banks whose implementation plans are

not approved will be subject to mandatory mergers or transfers of business under purchase and assumption, or required to exit under the Prompt Corrective Action procedures.

The need to allay deepening public anxiety over the soundness of the financial system led the Government to revise the Deposit Protection Act, bringing various types of financial instruments within the scope of guarantees by the Korea Deposit Insurance Corporation whose debentures were in turn fully backed by the Government. By this measure, the troubled financial system could escape its creeping paralysis.

The other problem undermining the stability of the financial industry was the unsustainable bad loans of financial institutions. The moral hazard endemic in the government-led development system had prompted domestic financial institutions to compete on asset scale rather than profitability. Economic recession further worsened the non-performing loan problem which, left the to the market mechanism, threatened the viability of the domestic financial industry as a whole.

In this context, the Government decided to swap the non-performing assets of financial institutions for government-guaranteed bonds. Bad loan resolution and deposit insurance contribute to stabilising financial markets and enhancing financial institutions' Basle capital adequacy ratios. However, they need a huge amount of money which has to be raised by issuing government-guaranteed bonds in the market. Government-backed bonds to the value of 64 trillion won are to be issued by the end of 1999 and money financed by the issuance of those bonds will be used to recapitalise financial institutions and repay depositors of closed and failed financial institutions.

2. Measures taken to improve the effectiveness of monetary policy

(i) Enhancing the effectiveness of monetary policy instruments

As the four-stage interest rate deregulation plan and other financial liberalisation schemes proceeded, the Bank of Korea did its utmost to expand and improve its monetary policy instruments. Measures taken to reform monetary policy instruments included the lowering of minimum reserve requirement ratios, a sharp reduction of the aggregate ceiling on

the Bank of Korea's discount window and the introduction of free competitive bidding for open market operations.

Lowering reserve requirement ratios

Until the early 1990s the Bank of Korea made frequent use of changes in reserve requirement ratios for managing domestic liquidity. In particular, they were actively used during the late 1980s when the Korean economy experienced a substantial current account surplus. In an effort to absorb the excess liquidity generated by the external sector, the average reserve ratio of 4.5% in 1986 was raised to 10.4% in 1990.

Although this measure was dictated by the pressure of circumstances, this episode suggested that frequent changes in reserve requirement ratios might bring about three main problems. First, because required reserves in Korea are non-remunerated, an increase in the ratios places banks at a competitive disadvantage in deposit-taking vis-à-vis non-bank financial institutions which are not subject to reserve requirements. Korean experience was that banks' share in deposit-taking continued to fall sharply, largely as result of the high reserve requirements imposed on them. More specifically, banks' share in total deposits fell from 48.8% in 1985 to 34.9% in 1990, and to 28.1% in 1997. Secondly, since reserve requirements are enforced on the basis of a strict regulatory framework, heavy reliance on changes in reserve requirement ratios for monetary control gives a central bank less scope for implementing market-oriented operations. This could in turn well delay the further development of financial markets. Finally, changes in reserve requirement ratios are probably not an effective tool in managing the liquidity of non-bank financial institutions. In particular, the effectiveness of changes in reserve requirements may well be more limited in managing liquidity where financial markets are more highly compartmentalised.

In view of these problems, the Bank of Korea no longer makes active use of changes in reserve requirements in managing domestic liquidity. The decisive break came with the sharp reduction of reserve requirement ratios undertaken in three steps between April 1996 and February 1997 (Table 2). The main purpose was to improve banks' profitability and competitiveness in deposit-taking vis-à-vis non-bank financial institutions which had not so far been subject to reserve requirements. The average reserve requirement ratio of 9.4% in March 1996 was lowered to 3.1% by February 1997. Along with these

measures, a 2.0% reserve requirement was introduced on deposit-taking through the sale of CDs upon the abolition of ceilings on their issuance in February 1997.

More recently the Monetary Board decided to raise the permissible ratio of vault cash in banks' reserve requirements. Specifically, banks were allowed to hold up to 35% of their reserve requirements as vault cash from 23rd May 1998 against the previous maximum of 25%.

Introducing and reducing the aggregate credit ceiling on the discount window

As a result of government-led economic development during the 1960s and 1970s, the original function of discount policy, to control the availability of bank reserves, had been substantially weakened. This is because a significant proportion of loans through the discount window was to a substantial extent operated as an automatic rediscount facility in support of policy or quasi-policy loans.

At the same time, on the price dimension of discount policy, changes in the discount rate in Korea did not significantly influence the volume of bank reserves. The main reason for this is that the discount rate was set at an artificially low level regardless of the movements of interest rates since the main role of the discount window was to support policy and quasi-policy loans.

The Bank of Korea undertook a couple of measures in this area in an attempt to restore the original function of discount policy. First, in accordance with the progress of financial liberalisation, the Bank substantially revised its rediscount and loan system in March 1994 (Table 3). The Bank of Korea's automatic rediscount facilities for commercial bills, export financing, etc. were then replaced by an aggregate credit ceiling system. Under this system the Monetary Policy Committee sets the aggregate ceiling for the entire banking sector every quarter and the Bank allocates credit quotas to individual banks each month within the range of the quarterly aggregate credit ceiling, according to predetermined performance criteria. Furthermore, several policy loans previously provided through the Bank's automatic rediscount facilities were transferred to fiscal funds.

Despite these measures, flexible adjustment of the aggregate credit ceiling was very limited in practice because a significant proportion of loans were still extended to support SMEs. In consideration of this, the

Table 2

Minimum reserve requirement ratios

In percentages

Type of deposit	Ratio			
	Previous	Revision of 23.04.96	Revision of 08.11.96	Revision of 23.02.97
Domestic currency deposits				
Employees' property formation savings	3.0	No change	2.0	1.0
Employees' long-term savings				
Employees' savings for housing loans				
Long-term savings deposits for housing				
Mutual installment deposits				
Housing installment deposits				
Time deposits with maturities of at least two years	8.0	6.0	4.0	2.0
Installment savings deposits with maturities of at least two years				
Time deposits and installment savings deposits with maturities of less than two years	11.5	9.0	7.0	
Cheque deposits, passbook deposits, savings deposits, preferential savings deposits and company savings deposits	11.5	9.0	7.0	5.0
CDs	None	None	None	2.0
Foreign currency deposits				
Non-residents' accounts	1.0	No change	No change	No change
Residents' accounts	11.5	9.0	7.0	No change

Table 3

Revision of the Bank of Korea's loan facilities

Previous	Revised (March 1994)
– Rediscount of commercial bills – Loans for foreign trade – Funds for SMEs, etc.	– Included within the aggregate credit ceiling
– Loans for agriculture, fishery and livestock	– Transferred to fiscal funds by end of 1998
– Loans for temporary shortages of reserve requirements	– Unchanged
– Loans related to SMEs – Loans for defence industry – Other policy-based loans	– Abolished (or transferred to fiscal funds)

Bank of Korea substantially reduced the ceiling in 1996 and 1997 as part of an operation to sterilise the additional liquidity induced when reserve requirements were lowered on the second and third occasions. More specifically, in accordance with the lowering of the minimum reserve requirement ratios, the aggregate credit ceiling was reduced from 9.2 trillion won to 6.4 trillion won effective from November 1996 and to 3.6 trillion won with effect from February 1997.

However, since the currency crisis in late 1997, the aggregate credit ceiling has been raised twice owing to the extreme difficulties faced by SMEs in accessing loans from financial institutions because of the severe credit crunch associated with financial sector restructuring. More specifically, the ceiling was raised from 3.6 trillion won to 4.6 trillion won with effect from mid-December 1997 and to 5.6 trillion won with effect from March 1998. Furthermore, no significant progress has been made so far in the area of flexible adjustment of the discount rate in accordance with the movement of market interest rates. Since a considerable share of loans through the discount window are still directed at SMEs, the discount rate has remained at 5%.

Elaboration of market-based operations

Along with the progress in interest rate deregulation, the use of open market operations has become the main instrument for the market-based management of reserve money. Since 1989 the Bank of Korea has

employed transactions with repos involving government bonds as an important instrument for the control of banks' short-term liquidity. In 1993 it introduced competitive bidding for repos and monetary stabilisation bonds (MSBs) on a limited basis with the main bidders being non-bank financial institutions. Since December 1995 it has actively employed free competitive bidding for issuing MSBs to banks, reflecting prevailing market rates in setting the acceptance price for bids. As a result, in 1996 the competitive bidding ratio for the Bank's repo transactions (the proportion of the total offered through competitive bidding) rose to 99.1% and that for the issuance of MSBs to 89.1%. Furthermore, the Bank of Korea has since February 1997 applied the method of competitive bidding to all offers of repo transactions and all issues and redemptions of MSBs.

The Bank also wishes to widen the range of instruments used in its market operations, including the activation of outright transactions involving government bonds, and to increase the frequency of market operations. Similarly, the scope of its counterparts for repo transactions was expanded to non-bank financial institutions such as merchant banks, securities companies, and investment and trust companies in September, October and December 1997 respectively. These measures greatly contributed to enhancing the effectiveness of liquidity management as well as the efficiency of monetary policy in respect of non-bank financial institutions.

(ii) Revamping the structure of the call market

The brokers in the call market in Korea had been eight investment and finance companies which converted into merchant banks in 1996. These companies were allowed to participate in the call market as both brokers and dealers in order to promote the smooth adjustment of surpluses or shortages of short-term funds among financial institutions, including non-bank financial institutions, and hence to integrate the segmented market.

However, the actual operation of the call market was not as satisfactory as had been expected. The participation of the merchant banks as brokers and dealers in the call market raised concerns about the transparency of the brokerage system. Since the main business of the merchant banks was to discount CP, there was scope for them to take

advantage of their role as call market brokers and dealers when they needed to raise funds for their own account.

Another more fundamental problem was recognised: since all transactions could be conducted either directly or through the brokers, direct transactions among banks continued at lower interest rates than those among or involving non-bank financial institutions. There were therefore two separate call markets, one among commercial banks and the other among non-bank financial institutions. This segmentation of the call market limited the scope not only for achieving a more efficient allocation, but also for the Bank of Korea to fine-tune short-term interest rates through its liquidity management.

Against this backdrop, after active consultations with the Bank of Korea, the Government took measures to revamp the structure of the call market in July 1996. The main feature was the establishment in November 1996 of the Korea Money Broker Corporation as the sole broker in the call market.

This measure was aimed at integrating the call market which was segmented between banks and non-bank financial institutions so that a more competitive market environment could result. Another objective was to enhance the representativeness of call rates and the scope for the Bank of Korea to fine-tune short-term interest rates.

(iii) Streamlining the payment and settlement system

There are two main categories of interbank payment and settlement systems in Korea. One is the net settlement system which includes the cheque clearing system, the bank giro system, the interbank cash dispenser ATM network system and the interbank funds transfer (IFT) system. It is a service system for transferring amounts of less than one hundred million won between banks. The other is BOK-Wire which is a real-time gross settlement (RTGS) system. At present all domestic banks and some foreign bank branches take part in the net settlement system while all banks including foreign bank branches handling payment and settlements in the interbank market participate in BOK-Wire.

BOK-Wire was launched in December 1994 to cope with the increasing volume of settlements. Through BOK-Wire, large-value financial transactions among banks, urgent money transfers of companies and other financial institutions and transactions with the Bank of Korea

are settled intraday. Even though BOK-Wire is basically an RTGS system, it also provides final clearing for fund transfers generated by the net settlement system.

To ensure settlement, the Bank of Korea employs two kinds of safety devices: a settlement risk management system established in September 1997 and temporary credit facilities. The settlement risk management system imposes net debit caps, collateral requirements and a loss-sharing arrangement among participants as preventive measures. Banks falling short of settlement balances are permitted to access temporary credits from the Bank of Korea, but the interest on them is at a penalty rate, set at 2% above average call rate during the half-month period expiring two days earlier than the maintenance period of bank reserves. Temporary credits are in fact rarely used since banks can borrow funds to cover shortages of settlement balances from the call market in almost all cases and at substantially lower rates.

3. Monetary operating procedures

(i) Strategic aspects of monetary policy implementation

Objectives and intermediate targets of monetary policy

There is a consensus that the final objectives of monetary policy are the stabilisation of prices, appropriate expansion of output, attainment of full employment and maintenance of external equilibrium. By and large, policies designed to achieve these objectives inevitably involve some trade-offs. Among these objectives, however, price stability is widely accepted to be not only an end in itself but also a necessary condition for achieving the other objectives. Price stability contributes to economic efficiency by reducing the uncertainties that tend to inhibit investment, directs resources to productive economic activity that might otherwise be diverted to mitigating the financial effects of inflation, and ensures greater efficiency of allocation in financial markets by reducing uncertainties associated with business and household financial decision-making.

In carrying out monetary policy, central banks set and operate a variety of intermediate targets so as to work effectively towards their final objectives. The Bank of Korea has long focused on a chosen

monetary aggregate rather than interest rates in its two-stage monetary control procedure to grapple with the persistent high inflation accompanying rapid economic growth.

For over 15 years from 1979, the Bank of Korea adopted M2 as the main intermediate target of its monetary policy. The rationale behind the adoption of M2 was based on empirical findings of a stable relationship between M2 and macroeconomic variables such as a nominal income and price level. In addition, M2 was found to be superior to other aggregates in terms of controllability.

However, the reliability of M2 as the intermediate target has declined noticeably since the mid-1990s, given the large portfolio shifts in the deposits of financial institutions that were to a large extent caused by financial liberalisation. In particular, the realignment of the money-in-trust system in May 1996, carried out to distinguish clearly between money-in-trust products and time and savings deposits, triggered large portfolio shifts from deposits in banks' trust accounts to time and savings deposits due mainly to the lengthening of maturities and the hike in cancellation fees. Hence, MCT which captures the effect of these portfolio shifts was adopted as an intermediate target in 1997 (Table 4).

The Bank of Korea currently uses M3, the broadest monetary aggregate, as its intermediate target, having adopted it in late 1997 in consultation with the IMF. This more closely reflects the large portfolio shifts between banks and non-bank financial institutions, triggered by the implementation of the fourth stage of the interest rate deregulation plan in July 1997.

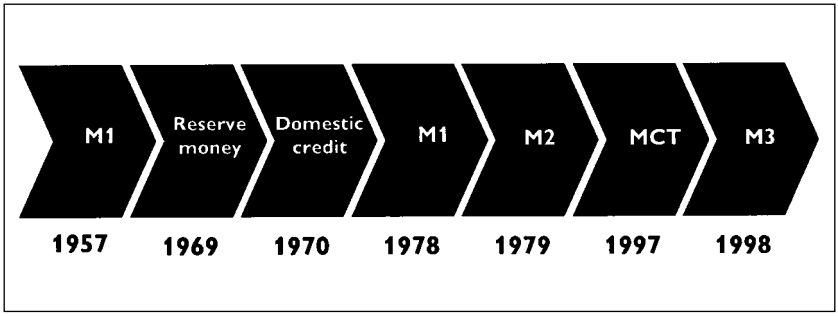
Table 4

Composition of monetary aggregates in Korea

Reserves money =	Banknotes and coin issued + reserve deposits of deposit money banks at the Bank of Korea
M1 =	Currency in circulation + demand deposits at deposit money banks
M2 =	M1 + quasi-money (time and savings deposits and residents[1] foreign currency deposits at deposit money banks)
MCT =	M2 + CDs + money in trust
M3 =	MCT + deposits at other financial institutions + financial debentures issued + commercial bills sold + repos + cover bills

Figure 1

Changes in intermediate target



The frequent changes in intermediate target in recent years clearly demonstrate the practical difficulty faced by the Bank of Korea in selecting an intermediate target during the process of financial deregulation (Figure 1). This is because the movements of the monetary aggregates have become more and more difficult to interpret, given the large portfolio shifts among different financial assets during the process of financial liberalisation.

Operational target

Until recently the Bank of Korea exclusively employed bank reserves as its operational target in day-to-day monetary operations. This reflected the fact that the financial environment was not mature enough for the Bank to adopt monetary operations centring on interest rates. More specifically, the corporate sector, given its high leverage ratio, has been generally very sensitive to interest rate movements. At the same time it was difficult for the monetary authority to identify an appropriate short-term interest rate which could fully reflect demand and supply conditions at the very short-term end of the financial markets, due mainly to the de facto segmentation of the call market between banks and non-bank financial institutions.

Nevertheless, the Bank closely monitored the movements of interest rates and tried to influence them, particularly the overnight call rate, while maintaining its control over bank reserves. This is because interest rates played an ever more important role in the transmission mechanism

of monetary policy as deregulation of interest rates neared completion. At the same time call rates have increasingly reflected supply and demand conditions at the short-term end of the yield curve, thanks to the measures aimed at integrating the segmented call market, including the establishment of the Korea Money Broker Corporation as the sole broker for the call market in July 1996.

Since the economy was hit by the currency crisis of late 1997, exchange rate stability has become a crucial concern for the monetary authority in its daily implementation of monetary operations. The Bank has thus had to manage short-term interest rates more flexibly in view of their close linkages to the foreign exchange market. Acting in close consultation with the IMF, the Bank of Korea decided to adopt the overnight call rate as its key operational target in addition to bank reserves.

Consequently, the Bank of Korea now uses both bank reserves and the overnight call rate as its operational targets. In its actual implementation of monetary operations, however, the relative importance of the two operational targets depends critically on ongoing monetary conditions. For instance, if the recent development of monetary growth is judged to be stable enough to sustain price stability over the medium and long term or if restoring the stability of the foreign exchange market becomes a more urgent task for the monetary authority, greater emphasis is placed on the overnight call rate in day-to-day monetary operations. However, if the development of monetary growth raises concerns about an acceleration of inflation over the medium and long term, the monetary authority focuses more closely on the actual level of bank reserves vis-à-vis its bank reserves target in its day-to-day monetary operations.

Monetary programming

In order to control the money supply, the Bank of Korea needs to set the target level of its intermediate target, M3. The Monetary Policy Committee is responsible for formulating the stance and direction of monetary policy. It approves monetary policy directives in its regular meetings on a monthly, quarterly and annual basis.

The process of setting the monetary target starts with projections of key macroeconomic variables including inflation rate and GDP growth rate. Once the projection of key macroeconomic variables is finalised,

Table 5

Monetary aggregates: target and actual growth rates

In percentages

	Target growth		Actual growth	
	M2	MCT	M2	MCT
1989[1]	15–18	–	18.4	25.7
1990[1]	15–19	–	21.2	27.6
1991[2]	17–19	–	18.3	21.4
1992[2]	18.5	–	18.6	24.9
1993[2]	13–17	–	17.3	23.2
1994[2]	14–17	–	17.6	23.6
1995[2]	12–16	–	13.7	22.0
1996[2]	11.5–15.5	–	17.8	18.6
1997[2]		15–20		14.9

[1] Annual growth rate compared with averaged monetary aggregate of the preceding year.
[2] Growth rate of averaged monetary aggregate calculated on a December-to-December basis.

the Bank decides its target inflation rate. Using these variables, the monetary authority decides the level of its intermediate target.

Currently, the EC method or a modified version of the Fisher equation is used to estimate the annual and quarterly target range of M3, considering GDP growth projections, the target inflation rate and projected changes in the velocity of money. In this process, one practical difficulty is the projection of changes in the velocity of M3. For this, both trend analysis and an econometric model are employed. While trend analysis captures the long-term trend and seasonal factors of the velocity, the econometric model captures the effects on the velocity of economic variables such as permanent income and degree of financial sophistication.

At the same time the Bank of Korea sets up annual and quarterly reserve money target ranges, which are consistent with the corresponding M3 targets by using the M3 multiplier. The Bank also makes projections on reserve money during the corresponding target periods. In the case of monthly programming, the Bank focuses more on the reserve money target rather than the M3 target because there is a two-month lag in the collection of preliminary data on M3.

Once all this work of targeting and forecasting has been done, the Bank's staff prepare a set of documents for approval by the Monetary Policy Committee including: (i) the most up-to-date developments in the financial markets and monetary area as well as real economic activities; (ii) the most likely monetary and financial environments during the target period; (iii) projections of its intermediate and operational targets; and (iv) alternative thrusts of monetary operations under a number of different scenarios. This set of documents is prepared on a monthly, quarterly and annual basis.

The Monetary Policy Committee meets on the first and third Thursday of the month. It discusses the direction of monetary policy at its first meeting of every month, quarter and year. After its deliberations, the Committee decides and approves the policy directives concerning monetary operations during a specified period and passes the approved directives to the operational department. The Committee has full autonomy in deciding the policy directives which include, among others, operational targets such as the overnight call rate and bank reserves. The operational targets in the policy directive are usually specified as a range rather than a specific level, given the volatility of financial markets.

(ii) Implementation of monetary operations

Forecasting liquidity

The successful implementation of a central bank's liquidity management depends critically on the monetary authority's ability to project the volume of liquidity generated by autonomous factors and sterilise the disturbances caused by them. The starting point in this context is how to forecast demand and supply in bank reserves as accurately as possible.

In principle, the Bank of Korea projects bank reserves at the beginning of each reserve maintenance period since the standard planning horizon of liquidity management in Korea is 15 or 16 days, coinciding with the maintenance period of bank reserves. The Bank currently adopts semi-lagged reserve requirement rules. Under these rules, banks have to hold required reserves computed on the basis of every half month's average deposits outstanding during a maintenance period that lags the computation period by seven days. The maintenance period corresponding to the first half month's computation period falls

between the eighth day and twenty-second day of the month, while that corresponding to the second half runs from twenty-third day of the month to the seventh day of the following month.

In the first stage, the Bank of Korea forecasts the expected level of demand for bank reserves at the beginning of each half-month reserve maintenance period by using the reserve money and M3 target. In estimating demand for bank reserves, the Bank first estimates reserve requirements which are consistent with the reserve money and M3 target. It also forecasts cash demand by the private sector, an important factor affecting demand for bank reserves, on the basis of information from various sources including payroll and bonus payments of diverse entities such as major corporations, schedules of national holidays and the historical trend of cash movements.

Once demand for bank reserves is estimated, the Bank of Korea forecasts the expected supply of bank reserves with particular emphasis on the autonomous factors which generate their supply. In doing so, it takes into account demand and supply in fiscal funds, schedules for government bond issuance and redemption, its own rediscount loans and repayments, interventions in the foreign exchange market and flows of currency to and from banks. During the reserve maintenance period, the Bank estimates the autonomous factors of bank reserves and revises this projection every business day based on newly acquired information.

Historically, net lending to the government has been the most volatile sector in Korea (Table 6). Fluctuations are particularly wide during the period from October to February, reflecting the heavy concentration of government expenditures around the end of the year. The variation in net foreign assets can also be quite substantial, especially when the foreign exchange market is more volatile.

The forecast autonomous factors, which affect bank reserves, are always subject to sizable errors even though considerable resources are devoted to obtaining timely information on the past and likely future behaviour of the more volatile factors. In particular, notwithstanding the day-to-day revisions, net lending to the government is the most difficult area to forecast since the amount and timing of disbursements of government expenditures are always very uncertain and subject to frequent change. For instance, scheduled disbursements of certain government expenditures which are confirmed one morning are often

delayed owing mainly to technical problems in the process of gaining approval for them.

Net foreign assets are also a difficult item to project, especially when the Bank of Korea needs to intervene heavily in the foreign exchange market. However, since the value dates of a major proportion of transactions in foreign exchange markets were changed from "value today" to either "value tomorrow" or "value spot" as part of the modernisation of the foreign exchange markets in 1994, the Bank's staff now know the scale of intervention at least one day before settlement.

In collecting the various types of information which may affect the autonomous factors, the Bank does not rely on any formal institutional arrangements. Instead, to gather the relevant data, its staff make frequent phone calls to the many related departments within the Bank and to various outside institutions ranging from the Ministry of Finance and Economy to local tax collection authorities.

Day-to-day liquidity management

While the Monetary Policy Committee is primarily responsible for formulating the monetary policy stance, the Financial Markets Department is solely responsible for day-to-day implementation. The staff of the Financial Markets Department decide details of monetary operations including the choice of instruments and the timing, frequency and size of operations.

Table 6

Mean and standard deviation of autonomous factors: January 1993 – May 1998

In billions of won

	Mean* (A)	Standard deviation* (B)	Coefficient of variation (B/A)
Bank reserves	– 58.4	1,221.1	20.90
Autonomous liquidity position			
Net foreign assets	273.4	1,646.0	6.02
Net lending to government	147.5	2,368.4	16.06
Other net assets	–534.9	3,551.8	6.64
Cash	56.2	1,184.3	21.08

* Of monthly changes.

At the end of each reserve maintenance period, staff finalise the projection of bank reserves on a daily basis during the coming reserves maintenance period. At the same time they make sure that projected bank reserves are consistent with achieving the reserve money or M3 target. Based on this information, staff decide the general direction of monetary operations including the setting of the bank reserve target during the reserve maintenance period.

The direction of day-to-day operations is set every day, considering the most recently revised projections of bank reserves, demand for bank reserves, the target level of operational targets and the most up-to-date information on movements of supplementary indicators. In this context, the role of supplementary indicators is to judge the thrust of monetary policy from a medium-run perspective and make sure that the current stance of monetary policy is in line with achieving its ultimate objectives.

As supplementary indicators, the Bank of Korea currently uses: (i) the exchange rate; (ii) narrower monetary aggregates such as M2 and MCT; (iii) long-term interest rates; and (iv) domestic credit. The selection of supplementary indicators and the relative importance attached to each of them depend on the priority of the policy objectives and the ongoing conditions of the financial and monetary environment. For instance, when achieving the stability of the foreign exchange market was an urgent task for the monetary authority after the recent currency crisis, the exchange rate became a relatively more important supplementary indicator.

Once the direction of its daily operations is determined, the Bank's staff decide on the instruments and size of the operations. In selecting the tools to be used, an important consideration is whether an excess or deficiency of bank reserves is a structural or a short-term phenomenon. In general, instruments with long-term maturities are employed when the imbalance is judged to be a structural phenomenon, while instruments with a short-term maturity are employed when the excess or deficiency is judged to be a short-term phenomenon.

After the implementation of its monetary operations, the Bank's staff check whether the outcome of the operations is consistent with the monetary authority's intention and determine whether or not additional operations are desirable. Since the Bank's projections of bank reserves are subject to sizable errors, a close look at the response of market participants after the operations is an important step in this context for

the monetary authority to check the accuracy of its projection of bank reserves and decide on the need for additional operations. This is because unexpected reactions on the part of the financial markets after an operation often reflect a difference between the markets' projections and those of the monetary authority and hence provide useful information as to the accuracy of the monetary authority's projections. At the close of the business day, staff evaluate the performance of the day's operations and revise their projection of bank reserves on the basis of information acquired during business hours.

Available monetary policy instruments

In implementing its monetary operations, the Bank of Korea essentially uses three orthodox instruments – reserve requirement policy, lending and rediscount facilities, and open market operations – to affect the availability and cost of liquidity to banking institutions and influence overall monetary and credit conditions. In addition to these policy instruments of an orthodox nature, the Bank is endowed with such policy instruments as setting and altering interest rates and controlling the volume of bank credits directly in periods of excessive expansion in money supply and intolerable acceleration of inflation.

However, as the liberalisation of financial markets had progressed remarkably, both direct controls and moral suasion such as window guidance were lifted in February 1991 so that they are no longer available. At the same time, among the three orthodox policy instruments, changes in reserve requirement ratios might not be well suited for normal monetary operations while the scope for flexible adjustment of the aggregate credit ceiling of the Bank's discount window and the announcement effect of changes in the discount rate are very limited at the moment. Open market operations have therefore become the main instrument in daily monetary operations.

Open market operations

The Bank of Korea currently has two tools for open market operations: repos involving government and government-guaranteed bonds and MSBs, and outright transactions involving government bonds and MSBs. Repos are used when an excess or deficiency of liquidity is judged to be a temporary phenomenon or short-term interest rates need to be fine-tuned, while outright transactions are employed when

an excess or deficiency of liquidity is confirmed as a structural phenomenon.

Repo operations

Since 1989 the Bank of Korea has developed repos as its main tool in open market operations. This is because repo operations do not require a liquid secondary market for the underlying securities. This aspect is particularly important in the case of Korea where the secondary markets for government and government-guaranteed bonds are not well developed.

However, one practical difficulty faced by the Bank is that it is difficult to assess the proper collateral values of the underlying securities involved in repos because their secondary markets are too thin for their market values to be quoted. In these circumstances, a potential problem faced by the Bank is that lack of proper assessment of the collateral value of the underlying securities could leave it vulnerable to loss. For instance, if the Bank provided liquidity through its repo operations based on an overvalued assessment of the underlying assets and its counterparts failed to repay, it could incur a loss. In order to overcome this problem, the Bank currently uses what is termed the "conservative haircut" assessment method. Under this approach, the collateral value of the underlying securities is determined uniformly by the lowest market value of any of them.

Repos are generally used to fine-tune bank liquidity. Although their periods range from one day to 91 days, repos with a maturity of 10 days or less are most frequently chosen. In general, longer-term (7–15 days) repos are used to absorb (cover) non-temporary reserve surpluses (shortages) while very short-term (2–3 days) repos are intended to modify day-to-day fluctuations in bank reserves.

When the Bank of Korea detects a clear tendency towards reserve surpluses (shortages), it selects longer-term repos to tighten (ease) bank reserves. These longer-term repo operations are called "keynote operations". Through them, the Bank can signal clearly its intention to financial institutions so that they can adjust their reserves smoothly during the maintenance period. Short-term repos are implemented mainly to smooth out temporary fluctuations in reserves and their use is confined to reserve surpluses (shortages) arising for reasons which are both unexpected and not easily avoidable.

Repos used to be carried out on the basis of amount-tenders. However, in March 1993 the Bank adopted a new scheme for repo transactions whereby their amounts and interest rates were determined by a process of competitive bidding aimed at enhancing market-based liquidity management. This method has been applied to all repo transactions since February 1997. When offering repos by competitive tender, the Bank selects either of two methods to set the price depending on financial market conditions: the American type method where the price or interest rate is that offered in the tender, or the Dutch type method where the lowest price or highest interest rate among successful tenders is uniformly applied. The Bank currently makes use of the Dutch type method on sales of repos and the American type method on purchases of repos.

The Bank of Korea began repo operations with merchant banks in September 1997, with securities companies in October 1997, and with investment and trust companies in December 1997. The main reason for this was that commercial banks, in the wake of the increasing credit risk of their counterparts in call markets, became more reluctant to deal with other non-bank financial institutions from the latter part of 1997, greatly heightening the volatility of call rates. To deal with this problem, the Bank decided to include additional institutions in the range of participants in its repo auctions. As a result, its counterparts for repo transactions increased during 1997 from 30 banks to 87 financial institutions. The Bank's operation desk sends counterparts the auction notice by BOK-Wire, the Bank's electronic funds transfer network, around half an hour before the auction. The auction itself is carried out by means of the electronic bidding system, introduced in July 1997 as a subsystem of BOK-Wire. Successful bidders must clear their settlement balances within banking hours on the same day.

Outright transactions

In operating outright transactions, the Bank buys and sells government bonds, government-guaranteed bonds and MSBs issued by itself in the open market. In practice, outright transactions mainly involve MSBs, reflecting the still limited availability of government and government-guaranteed bonds. However, outright transactions in government and government-guaranteed bonds have been employed more frequently as the secondary markets in these bonds become more active.

At present, MSBs are issued by competitive auction or direct sale. The interest rate on an MSB issued by competitive auction applies equally to all successful underwriters through the Dutch type method, while the direct sale rate is set at a slightly lower level than the competitive bidding rate to encourage active participation of financial institutions in the competitive bidding. In contrast, the Bank of Korea selects the American type method when it carries out early redemption of MSBs and outright purchase of government and government-guaranteed bonds. Similarly, the Dutch type method is applied to outright sales of government bonds.

In practice, the Bank notifies the auction of MSBs to its counterparts comprising banks, trust accounts of banks, merchant banks, securities companies, securities investment and trust companies and life insurance companies by BOK-Wire every Thursday. The auction takes place at 2 p.m. on the Friday of the same week by electronic bidding. The Bank also informs all participants of the auction outcome by BOK-Wire. Successful bidders deposit funds with the Bank by the following Monday. Instead of drawing physical securities in bearer form, most financial institutions register their MSBs in book-entry form. The scale of weekly issuance of MSBs is determined on the basis of such factors as MSBs' redemptions and money and reserve conditions.

There are 11 MSB maturities ranging from 14 days to two years: 14 days, 28 days, 63 days, 91 days, 140 days, 182 days, 364 days, 371 days, 392 days, 546 days and two years. In December 1996 the Bank introduced its first coupon-bearing MSBs, which have a two-year maturity with quarterly coupons, in a move to diversify the instruments available to it for open market operations. The ceiling on the volume of MSBs which may be issued is determined by the Monetary Policy Committee as a percentage of M2, currently 50%.

Signalling and transparency

One important consideration in conducting market-oriented monetary operations is how best to reinforce any influence that liquidity adjustments by the central bank may have on interest rates through specific mechanisms vis-à-vis market participants. As reserve requirements have been reduced to approach the level of the working balances banks should maintain for their payments and settlements business, signalling has become more important to achieve interest rate

objectives and limit the volatility of short-term interest rates, given the very low interest elasticity of the demand for working balances and the importance of expectations about future short-term interest rates.

Until recently, the Bank of Korea paid less attention to the market signalling effect of its monetary operations. This reflected, among other things, two reasons: (i) greater focus was placed on quantitative objectives as the country continued to suffer from chronic inflationary

Table 7

Instruments for open market operations

	Repos	Outright transactions
Auction purpose	Fine-tuning	Absorbing structural liquidity surplus (shortage)
Frequency and interval	As occasion demands	Government and government-guaranteed bonds: when needed MSBs: every week
Maturity of auction instrument	Within 91 days	Government and government-guaranteed bonds: no limit MSBs: principally 364 days
Type of underlying security	Government and government-guaranteed bonds and MSBs	Government and government-guaranteed bonds and MSBs
Counterparts[1]	Banks, merchant banks, securities companies, investment and trust companies	Banks, trust accounts of banks, merchant banks, securities companies, life insurance companies[2]
Auction procedure	By tender: Providing liquidity: American-type method Absorbing liquidity: Dutch-type method Auction results made public	By tender: Providing liquidity: American-type method Absorbing liquidity: Dutch-type method Auction results made public
Impact of tender rate on other money market rates	Influences call rates directly and thereby those in other short-term financial markets	Financial debentures with maturity of one year
Incidence of, and measures to prevent, non- competitive practices	No incidence Measures include Suspension of auction participation, cancellation of counterpart status	No incidence Measures include suspension of auction participation, cancellation of counterpart status

[1] No restriction in principle but every year the Bank issues a new list of eligible counterparts.
[2] Excludes life insurance companies for outright transactions of government bonds.

pressure; and (ii) the role of interest rates in the transmission mechanism of monetary policy was relatively weak given the segmented nature of financial markets and the regulation of interest rates.

As the deregulation of interest rates nears completion and domestic financial markets are increasingly integrated into international financial markets with the progressive removal of restrictions on cross-border financial flows, the role of signalling in the process of market operations has become more important. This is particularly so in Korea, where the announcement effect of changes in the discount rate is severely limited due mainly to the lack of flexibility in discount rate adjustment and developing other signalling mechanisms has emerged as an important task.

Before the overnight call rate was adopted as an operational target, the Bank of Korea sent signals to financial institutions by altering quantities, maturities and bidding times of its open market operations. For example, the Bank advanced the bidding time for reverse repos or offered larger quantities or longer maturities than expected in the financial markets when it intended to lower market interest rates.

Since the Bank started to use overnight call rates as its operational target, the public announcement of the successful bidding rate immediately after the auction has become a more important signalling mechanism. By adjusting the amount and the internally acceptable interest rate at auctions, the Bank can change the successful bidding rate, and the subsequent public announcement of this rate can convey its intention regarding short-term interest rates. For instance, if the Bank intends to raise short-term interest rates, it increases the scale of its auction in absorbing operations and raises its internally acceptable bidding rate so as to push up the successful bidding rate of the auction. Thus the public announcement of the higher successful bidding rate is interpreted by market participants to mean that the Bank is about to raise short-term interest rates.

In line with this, the Bank of Korea tries to disclose all the relevant information about the details of its monetary operations on a timely basis in order to enhance the transparency of its monetary policy. Decisions of the Monetary Policy Committee which are followed by immediate measures are made public by press release immediately after the meeting. Resolutions and minutes are published in the monthly bulletin issued by the Bank of Korea two or three months after the

meeting. The Bank also announces a target range for monetary growth and periodically publishes economic statistics. At the same time it discloses information on its open market operation auctions associated with repo transactions, outright transactions of government bonds and issuance or early redemption of MSBs. The auction notice covering bidding time, quantity and maturity of an operation is circulated to its trading counterparts through BOK-Wire and released to the press half an hour before the auction. Details of the outcome of the auction including quantity and average interest rate of successful bids are made available to the press immediately after the auction. However, information on individual contracts is never released.

One important issue in the context of the transparency of monetary operations is whether or not a central bank should make public the specific level of operational targets. Making public the specific level of its operational targets might well help a central bank since it would give clear signals of the monetary authority's intention to all market participants and thus help bring about the desired monetary environment. However, it could also result in a loss of central bank credibility if the monetary authority frequently deviated from its announced course in the face of sudden changes in financial market and monetary conditions. The likelihood of this problem would be much greater in countries suffering severe financial turmoil.

In the case of Korea, the specific ranges of the operational targets are not made public after the Monetary Policy Committee meeting. There are two main reasons why the Bank of Korea believes it premature to make specific targets public. First, since the Bank has only recently adopted the overnight call rate as an operational target and the financial market environment has remained volatile following the currency crisis, public announcement of a specific short-term interest rate target might well result in a loss of market credibility for the Bank. This is because the highly volatile financial market environment makes it difficult for the Bank to commit itself to a pre-announced target. Secondly, Korean financial markets need to be further widened and deepened. Managing the short-term interest rate strictly in line with a pre-announced target might prevent market forces from playing a fully effective role in interest rate determination, further delaying financial market development.

4. Recent experiences in monetary operations

(i) Monetary operations before and after the currency crisis

Patterns of the autonomous factors of liquidity generation

Figure 2 displays the recent pattern of selected autonomous factors: net foreign assets, net lending to the government, other net assets and cash. Net foreign assets became a huge liquidity absorption channel between October and December 1997, reflecting the contemporary currency crisis. However, net foreign assets have shifted to a liquidity supply channel since the beginning of 1998, following the country's adoption of a floating exchange rate regime and the resumption of capital inflows. Figure 2 also shows the heavy bunching of government expenditures around the end of 1997. The sharp drop in other net assets in December 1997 reflected offsetting changes in the higher valuation of net foreign assets following the sharp depreciation of the won. Cash has become a liquidity supply channel since December 1997, reflecting the fact that the public sought to minimise their cash holdings in the face of the severe contraction of economic activity and higher interest rates.

Figure 2

Recent pattern of autonomous factors

In trillions of won

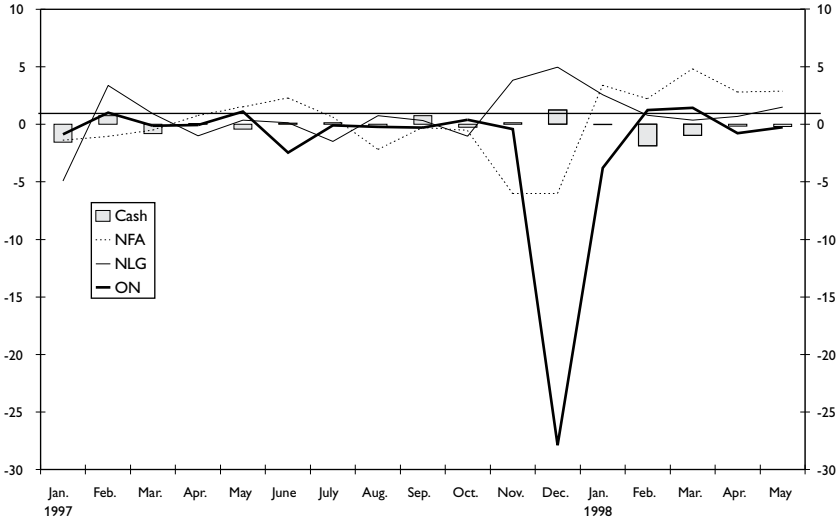


Table 8 compares the average and the variability of each autonomous factor during the recent period with those of the previous period. Most notably, net foreign assets have become the most variable item, reflecting the volatile movements of foreign capital flows. Both net lending to the government and cash have shifted on average to a net supply channel during the recent period, and their variability has declined significantly.

Implementation of monetary operations

In early 1997 a large number of highly leveraged *chaebol*, interlinked Korean business groups or conglomerates, became insolvent. The high rate of insolvencies reflected a number of factors, including excessive investment in certain sectors, weakening export competitiveness and the Government's new-found willingness to allow troubled *chaebol* to fail. The insolvencies spilled over into a sharp increase in the non-performing assets of financial institutions.

At the same time Korea's external financing situation deteriorated markedly in late October 1997 following the sharp decline in the Hong Kong stock market on 23rd October and the downgrading of Korea's sovereign risk status by credit rating agencies such as Standard & Poor's. New external financing virtually dried up and substantial difficulties were experienced in rolling over the relatively large amount of short-term debt, bringing about a currency crisis. In just two months, between the end of October and the end of December 1997, the won lost around 32% of its value.

Symptoms of the twin crises, both the financial crisis and the currency crisis, have made the Bank of Korea's monetary operations very complicated. While the deterioration of profitability in both the financial and the corporate sectors called for lower interest rates, the heavy pressure on the won required a high level of interest rates. Before an impending currency crisis became clearly apparent, the response of the Bank's monetary policy was to adopt an eclectic approach in day-to-day monetary operations while keeping the growth in MCT, its intermediate target, at a lower rate. The Bank of Korea tried to raise the overnight call rate when pressure on the won appeared to be very heavy and it tried to lower the overnight call rate when the foreign exchange market appeared to be stabilising. Consequently, the call rate was stabilised at around 14% and MCT growth edged below the bottom of its target range.

Table 8

Breakdown of net autonomous position

In billions of won

	January 1993 – December 1996			January 1997 – May 1998		
	Mean* (A)	Standard deviation* (B)	Coefficient of variation (B/A)	Mean* (C)	Standard deviation* (D)	Coefficient of variation (D/C)
Net foreign assets	304.6	779.0	2.56	185.6	3,007.3	16.20
Net lending to government	–53.9	2,394.4	44.39	716.3	2,265.1	3.16
Other net assets	–58.5	656.1	11.21	–1,789.7	6,825.9	–3.63
Cash	143.0	1291.7	9.03	– 189.1	788.8	–4.17

* Of monthly changes.

However, this eclectic approach could not be sustained as there was mounting downward pressure on the won and the Bank's official reserves dried up rapidly from early November 1997. As a result, the Korean Government turned to the IMF at the end of November 1997.

In the face of mounting downward pressure on the won, an urgent task for the Bank of Korea was to prevent its further depreciation. Under these circumstances, the Bank of Korea needed to manage short-term interest rates flexibly in view of their close linkages to the foreign exchange market. Therefore, acting in close consultation with the IMF, the Bank of Korea decided to adopt the overnight call rate as an operational target in addition to bank reserves.

After adopting the overnight call rate as its operational target and in a desperate bid to stabilise the foreign exchange market, the Bank raised the overnight call rate to 25%, the legal maximum interest rate, at the beginning of December 1997. Despite this measure, the strong downward pressure on the won did not ease and it depreciated sharply. In view of this, the Bank raised the overnight call rate to over 30% in late December 1997 after the ceiling on interest rates had been raised to 40%. This high level of short-term interest rates was maintained until the foreign exchange market had stabilised in February 1998.

Table 9

Recent trends of selected economic indicators

	March	June	Sept	Nov	Dec	March	June	Aug
			1997				1998	
Overnight call rate[1] (%)	13.03	11.55	14.42	12.10	31.32	22.05	14.41	8.51
Won/US dollar exchange rate[1]	897.1	888.1	965.1	1,163.8	1,415.2	1,378.8	1,385.2	1,331.8
Official foreign reserves[1] (US$ bn)	29.15	33.32	30.43	24.40	20.41	29.75	40.90	45.09
Usable foreign reserves[1] (US$ bn)	21.14	25.31	22.42	7.26	8.87	24.15	37.04	41.35
MCT growth[2] (%)	17.7	14.8	14.1	13.3	14.7	9.5	8.4	6.6
Current account[1] (US$ m)	–1,793.5	–223.0	–509.9	864.0	3,585.4	3,630.4	3,240.8	–
Capital account[1] (US$ m)	2,309.1	1,929.4	452.3	–4,464.4	–6,370.5	–192.1	–47.9	–
Monthly change in CPI (%)	0.4	0.2	0.5	0.1	2.5	– 0.2	0.0	0.3

[1] Month-end. [2] Average rate of increase compared with the same period of the previous year.

After the strong downward pressure on the won had eased owing mainly to overshooting of domestic short-term interest rates and partial restoration of confidence in the international financial markets, the Bank's dual aims in its monetary operations were to build up and maintain a cushion of foreign reserves and to bear down progressively on the upward trend of inflation. In this context, the Bank faced a practical problem in determining the level of the overnight call rate consistent with achieving these goals.

First, in seeking to build up and maintain a comfortable level of foreign currency reserves, the Bank of Korea was in a dilemma. In the short and medium term, it had to secure inflows of foreign portfolio investment. At the same time, however, it needed to prevent any further

deterioration of the export industries which would generate foreign currency reserves in the long term. Achieving short and medium-term objectives called for higher interest rates, while lower interest rates were required for achieving long-term objectives. The ideal level of interest rate might therefore be the lowest possible rate that could still attract sustainable capital inflows in the form of foreign portfolio investment.

Theoretically, one way to find this target level of the interest rate would be to apply the interest rate parity theory. In this way, the target level can be estimated by adding to the annual benchmark yield of foreign investors in Korea the annualised rate of the forward premium over the spot exchange rate. However, given the instability of spot rate movements since the crisis and the high volatility of the forward exchange rate reflecting the thinness of the market, applying this method has been problematic.

At the same time the Bank faced two other practical problems in finding the target level of the interest rate consistent with curbing inflation in the medium term: (i) uncertainty as to how rapidly the lagged effects of changes in the exchange rate feed through into inflation; and (ii) difficulty in assessing the effects of exchange rate movements on inflation given the greater increase in exchange rate volatility since the crisis broke.

In order to overcome these practical problems, the Bank of Korea tried to find the ideal level for the overnight call rate on a trial-and-error basis. More specifically, it gradually lowered the rate within a very narrow range, keeping a close watch on the development of the foreign exchange market and foreign capital inflows as well as on inflation. Consequently, the overnight call rate, which had been running at 30% in late December 1997, was progressively brought down to around 8% at the end of August 1998.

Thanks to these efforts by the Bank of Korea as well as other measures taken by the Government, the foreign exchange market stabilised markedly from March 1998. The won stabilised at around 1,300 won per US dollar in August 1998 from a peak of 2,100 won in December 1997. In addition, the country's usable foreign reserves increased sharply to over $41 billion at the end of August 1998 from around $7billion at the end of November 1997. At the same time monthly inflation, in terms of the consumer price index, eased to 0.3% in August 1998 from a peak of 2.5% in December 1997.

(ii) Empirical assessment of the performance of recent monetary operations

As the Bank of Korea accommodates the movements of financial market conditions with a primary emphasis on market sentiment, market-oriented operations play an increasingly important role in its implementation of monetary policy. However, their employment is based on the recognition that a more quantity-oriented approach may well result in greater volatility in interest rates with little or no gain in the controllability of the intermediate target. The Bank's reactions to disturbances in financial markets depend on its assessment of their causes, severity and likely duration and on judgements about market sentiment and dynamics.

In this context, the Bank of Korea had in recent years strengthened its focus on interest rates, mainly the overnight call rate, and it had also attempted to smooth out sudden large swings in short-term market interest rates. As a result, the volatility of the overnight call rate had been declining until November 1997. However, it increased substantially after the crisis in response to the Bank's attempt to manage short-term interest rates to stabilise the foreign exchange markets. On the other hand, the volatility of the reserve accumulation ratio (RAR), a proxy for bank liquidity positions, has continuously increased over the same period. This implies that the Bank has focused more on financial market conditions, such as short-term interest rates and the exchange rate, than on bank reserves as it had before the crisis.

Table 10

Volatility of interest rates and the reserve accumulation ratio

	Coefficient of variation standard deviation/mean			
	1995	1996	Jan.–Nov. 1997	Dec. 1997–Aug. 1998
Overnight call rate	0.17	0.16	0.09	0.26
91-day CD yield	0.11	0.11	0.07	0.21
Three-year bond yield	0.10	0.04	0.07	0.22
Reserve accumulation ratio	0.19	0.16	0.25	0.38

Note: Figures calculated on daily data.

An interesting empirical question is whether it is possible for the Bank of Korea to use the call rate as its operating target by using time-series data before the currency crisis. To test this possibility, a structural VAR model is estimated using recent historical data, following Clarida and Gertler's methodology, to identify the Bank of Korea's behaviour with respect to the overnight call rate. The notional policy reaction function of the overnight call rate is estimated under an assumption that the Bank has used the overnight call rate as its operational target. If the estimated policy reaction function of the call rate is consistent with economic theory and its coefficients are statistically significant, the call rate could be adopted as a useful policy variable by the Bank of Korea. The signs of the coefficients are estimated to be in accordance with economic theory, implying that the Bank has raised the call rate in the event of an unanticipated increase in money supply or depreciation of the currency, although the significance level of each coefficient is quite low.

The empirical result weakly supports the possibility of adopting the overnight call rate as an official operational target. The result appears to reflect the fact that the Bank of Korea has become increasingly dependent upon market-oriented operations, which inevitably demands that it maintain an acceptable level of market interest rates, either covertly or overtly (details of results in Annex II).

Another interesting empirical question is whether the effects of the monetary operations on financial market conditions have changed following the adoption of the overnight call rate as an operational target. More specifically, the question is whether the effects of bank reserves, which have been used by the Bank as its operational target for more than 10 years, or of the public announcement of the repo rate on selected market interest rates have changed before and after the adoption of the overnight call rate as an operational target. To do this, Granger's causality tests are applied.

Granger's causality tests are carried out using daily time-series data to analyse the precedence of these two variables vis-à-vis financial market conditions during the period from January 1995 to October 1997 and during the period from January 1998 to August 1998 respectively, excluding November and December 1997 which were particularly influenced by the currency crisis. The same test is run for the repo rate and market variables for the post-crisis period when the Bank has made

intensive use of the overnight call rate as its operational target. The RAR is used as a proxy variable for bank reserves. The repo rate is the successful bidding rate at auction for maturities of one or two days. As variables to represent financial conditions, the overnight call rate, yields on three-month CDs and yields on three-year corporate bonds are employed.

During the period from January 1995 to October 1997, the causality turning from the RAR to all three interest rate variables is found to be significant. However, after the beginning of 1998, the causality from the RAR to interest rates is not clear while the unidirectional causality of the repo rate on market interest rates becomes strongly significant. From these empirical results (Annex III), it is fair to infer that bank reserves influenced financial market conditions until 1997, but that the repo rate, rather than bank reserves, has indeed influenced financial market conditions since the beginning of 1998.

5. Conclusions

The pace of change in monetary operations in Korea has accelerated since 1996 as financial liberalisation including interest rate deregulation, capital market opening and foreign exchange liberalisation nears completion. During liberalisation the Bank of Korea has been concentrating its efforts on elaborating its monetary policy instruments. Measures adopted have included lowering the reserve requirement ratio, reducing the aggregate ceiling on rediscounts and introducing competitive bidding for open market operations. In addition, reforms of the call market and the payment and settlement system have been carried out with a view to enhancing the efficiency of financial markets.

At the same time various efforts have been made to reform the actual execution methods of monetary operations. Market-based monetary operations have been more actively used and the Bank of Korea has made efforts to enhance its signalling capacity and the transparency of its operations in order to convey its intentions regarding money market conditions in a convincing and credible manner. It has increasingly emphasised the movements of short-term interest rates and the exchange rate in its monetary operations. In addition, the

Bank has employed the overnight call rate as its operational target since December 1997.

Despite these efforts, it must be admitted that there remains scope for further progress in the area of monetary operations in Korea. The apparent stickiness of central bank lending and rediscount facilities has made the Bank of Korea rely more on open market operations. While heavy reliance on this market-oriented instrument is desirable in a normal situation, the limited scope for alternative instruments leaves open the possibility of the sustainability of market-oriented operations being jeopardised in the event of a sharp deterioration of macroeconomic conditions. The diversification of monetary policy instruments thus appears important.

To alleviate the burden placed on open market operations and establish a mechanism for transmitting signals of central bank intentions, the rigidity of the Bank of Korea's lending and rediscount facilities must be lessened. In this context, an initial step should be to remove the direct linkage between the remaining loans subject to the aggregate credit ceiling system and directed loans as soon as circumstances permit so that discount policy can serve as a safety valve to complement the Bank's open market operations in the event of an unexpected change in macroeconomic conditions and a sharp fluctuation in the money market situation. In addition, the Bank of Korea's rediscount rate needs to fully reflect the prevailing market-determined interest rates and regain its function in transmitting policy signals regarding the desired level of interest rates.

Annex I

Financial institutions in Korea

August 1998

Central bank		The Bank of Korea
Banking institutions (deposit money banks)	Commercial banks	Nationwide commercial banks (13) Local banks (8) Foreign bank branches (52)
	Specialised banks	Industrial Bank of Korea National Agricultural Cooperative Federation National Federation of Fisheries Cooperatives National Livestock Cooperatives Federation
Non-bank financial institutions	Development institutions	Korea Development Bank Export-Import Bank of Korea Korea Long-Term Credit Bank
	Savings institutions	Trust accounts of banking institutions Mutual savings and finance companies Credit unions Mutual credit facilities Postal savings
	Investment institutions	Merchant banking corporations (14) Securities investment trust (management) companies (30) Korea Securities Finance Corporation
	Life insurance companies	Life insurance companies (33) Postal life insurance
Other institutions		Securities companies (54) Credit guarantee funds (2) Leasing companies (25) Non-life insurance companies (17)

Annex II

Policy reaction function

Structural VAR approach

The Bank of Korea's policy reaction function is estimated by using a structural VAR model, following the methodology developed by Clarida and Gertler (1996), on the assumption that the Bank has treated the overnight call rate as its operational target. The estimation of the policy reaction function is carried out in order to confirm whether a short-term interest rate, namely the overnight call rate, could be adopted as an operational target.

The general model is

$$\text{Structural VAR:} \quad Y_t = CY_t + \sum_{i=1}^{\infty} A_i Y_{t-i} + e_t \qquad (1)$$

$$\text{Reduced form:} \quad Y_t = \sum_{i=1}^{\infty} B_i Y_{t-i} + u_t \qquad (2)$$

where C, Ai and Bi are square coefficient matrices and the diagonal elements of C are equal to zero.

The relationships among the coefficient matrices and the innovations of the variables are derived from equations 1 and 2.

$$B_i = (I - C)^{-1} A_i \quad \Rightarrow \quad u_t = (I - C)^{-1} e_t \qquad (3)$$

For the analysis, five variables are chosen to describe the Korean macroeconomy: the industrial production index (ip) and the consumer price index (p) characterise the real economy, and money supply (M3), the overnight call rate (r) and the won/US dollar exchange rate (er) are the Bank of Korea's policy variables. All the variables used in this analysis are monthly data and are seasonally adjusted. The data are chosen during the period from January 1991 to August 1997 since interest rate deregulation started in 1991. Finally, four variables (ip, p, M3, er) are logged and the model includes six lags (1, 2, 3, 6, 9, 12) for a parsimonious parameterisation, given the inadequate length of the sample period.

In order to solve the identification problem, a number of assumptions are adopted. First, there is a recursive structure among variables with ordering ip, p, M3, r and er. Secondly, the innovations of M3 are determined by those of ip, p and r, while innovations of r are influenced by those of M3 and er. Finally, exchange rate innovations may be influenced by any of the other innovations in the system.

The estimates of the structural VAR are shown in Table 11. The signs of the estimated coefficients are in general consistent with the economic theory, although they are not statistically significant. The policy reaction function of the call rate suggests that the monetary authority raises the overnight call rate upon unanticipated increases in the money supply (M3) and currency depreciation. The impulse responses of the call rate (Figure 3) also indicate that a rise in the call rate induces the temporary reduction of inflation and M3, and causes the currency to appreciate, but its impact on industrial output does not appear to be clear enough.

Table 11
Structural VAR estimates

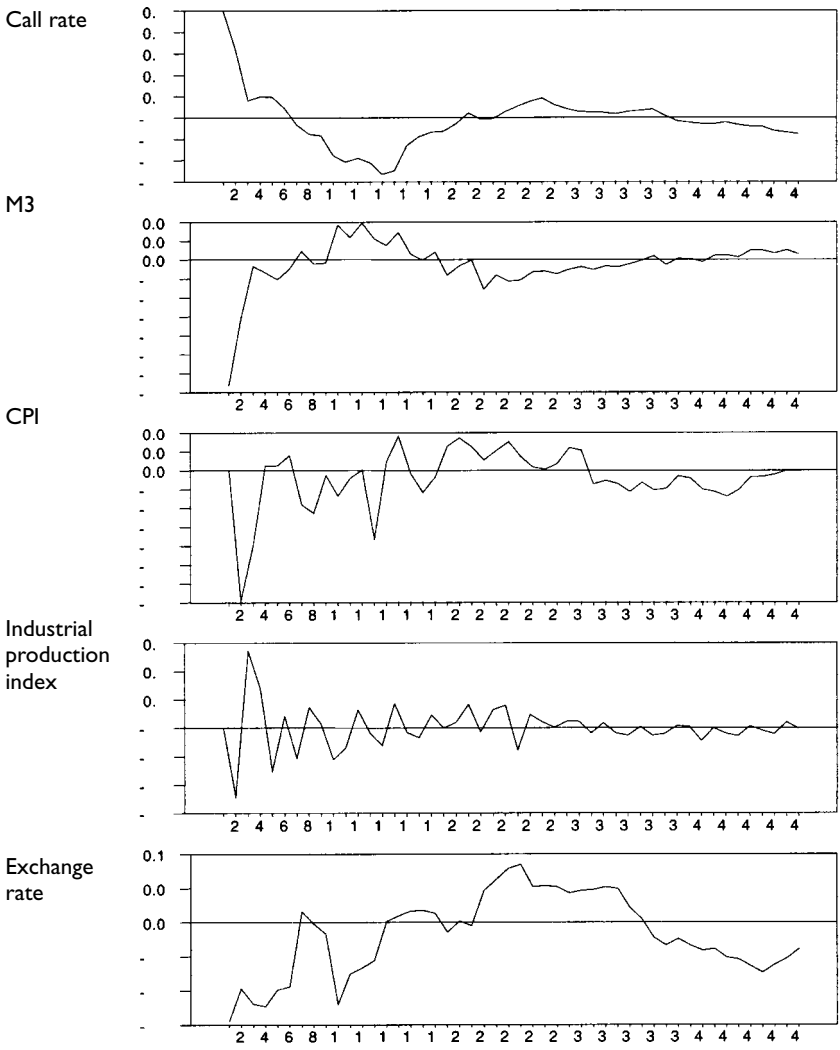
u_p	$= -0.005u_{ip} + e_p$ (0.019)
u_{M3}	$= 0.017u_{ip} + 0.480u_p - 0.268u_r + e_{M3}$ $(0.279) \quad (0.510)$
u_r	$= 1.814u_{M3} + 0.945u_{er} + e_r$ (1.741)
u_{er}	$= -0.170u_{ip} - 0.461u_p + 0.730u_{M3} - 0.097u_r + e_r$ $(0.059) \quad (0.540) \quad (1.748) \quad (0.415)$

Note: Figures in parentheses are standard errors.

Table 12 displays a variance decomposition for the call rate according to which both money supply (M3) shocks and exchange rate shocks are the main source of the variation in the overnight call rate. Over the 12-month horizon, however, the CPI also accounts for the

Figure 3

Impulse responses of the call rate to other variables



behaviour of the call rate. In addition, it is found that the shocks to industrial production appear to have little influence on the call rate.

Table 12

Variance decomposition for the call rate

Horizon in months	Percentage of forecast error variance due to				
	Call rate	M3	CPI	IP	Exchange rate
6	25.9	48.2	2.9	0.7	22.3
12	24.0	40.1	18.0	1.3	16.6
24	26.0	31.2	20.7	2.0	20.1
48	25.7	29.4	19.7	2.2	23.0

Annex III

Granger's causality test

Granger's causality test is employed to analyse the precedence of the reserve accumulation ratio (RAR), as a proxy variable for bank liquidity positions, and the repo rate to market interest rates. The RAR is defined as the sum of required reserves and accumulated excess reserves divided by reserve requirements. The choice of the RAR instead of actual reserves is due to the fact that the level of actual reserves dropped sharply to one third after 1996, following the lowering of reserve requirement ratios (Figure 4). The repo rate is the successful bidding rate at auction for maturities of one to two days.

The causality test from the RAR is carried out using daily data during the period from January 1995 to October 1997 and during the period from January 1998 to August 1997 respectively, and that from the repo rate during the period from January 1998 to August 1998. Figures 5 to 7 plot the movements of the RAR, repo rate and interest rates, namely the overnight call rate and yields on CDs and corporate bonds.

The empirical results are summarised in Tables 13 and 14 according to which unidirectional causality running from the RAR to the call rate as well as from the RAR to yields on CDs and corporate bonds is detected during the period from January 1995 to October 1997. After 1998 the causality from the RAR is not clear while the repo rate unidirectionally influences market interest rates. However, bidirectional causality is found between the call rate and yields on CDs and corporate bonds during the entire test period.

The change of unidirectional causal variable from the RAR to the repo rate after 1998 shows that the repo rate, the public announcement of the successful bidding rate at auction, has become a more important signalling mechanism. This result appears to support the hypothesis that the repo rate, by affecting the overnight call rate, an operational target of the Bank of Korea, does influence short-term and long-term interest rates. Furthermore, the bidirectional causality relationships between the call rate and yields on CDs and corporate bonds could be interpreted as indicating that there is some feedback among them, reflecting moderate arbitrage between short-term and longer-term financial markets.

Table 13

Granger's causality test results (I)

January 1995–October 1997

Null hypothesis	F-statistic		Causality results
	4 lags	8 lags	
RAR not cause call rate	3.02**	1.74*	RAR ⇒ call rate
Call rate not cause RAR	1.43	1.21	Call rate ≠> RAR
RAR not cause CD yield	5.06***	3.60***	RAR ⇒ CD yield
CD yield not cause RAR	1.26	1.24	CD yield ≠> RAR
RAR not cause bond yield	5.02***	3.30***	RAR ⇒ bond yield
Bond yield not cause RAR	1.56	1.10	Bond yield ≠> RAR
Call rate not cause CD yield	12.11***	6.76***	Call rate ⇒ CD yield
CD yield not cause call rate	6.77***	3.32***	CD yield ⇒ call rate
Call rate not cause bond yield	4.13***	2.09**	Call rate ⇒ bond yield
Bond yield not cause call rate	3.69***	1.74*	Bond yield ⇒ call rate

*** significant at 1% level. ** significant at 5% level. * significant at 10% level. RAR = reserve accumulation ratio.

Figure 4

Actual reserves and required reserves

In trillions of won

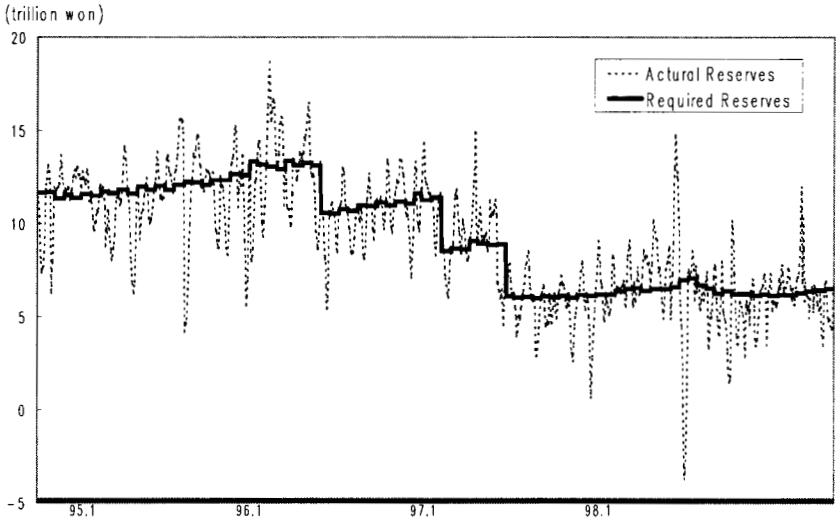


Table 14

Granger's causality test results (II)

January–August 1998

Null hypothesis	F-statistic		Causality results
	4 lags	8 lags	
RAR not cause call rate	0.09	0.53	RAR ≠> call rate
Call rate not cause RAR	0.85	0.85	Call rate ≠> RAR
RAR not cause CD yield	2.34*	2.47**	RAR ⇒ CD yield
CD yield not cause RAR	0.91	0.78	CD yield ≠> RAR
RAR not cause bond yield	1.84	1.70*	RAR ≠> bond yield
Bond yield not cause RAR	0.54	1.60	Bond yield ≠> RAR
RP rate not cause call rate	2.71**	3.41***	RP rate ⇒ call rate
Call rate not cause RP rate	1.86	1.48	Call rate ≠> RP rate
RP rate not cause CD yield	5.94***	4.08***	RP rate ⇒ CD yield
CD yield not cause RP rate	1.57	1.17	CD yield ≠> RP rate
RP rate not cause bond yield	13.74***	8.11***	RP rate ⇒ bond yield
Bond yield not cause RP rate	1.98*	0.88	Bond yield ≠> RP rate
Call rate not cause CD yield	4.05***	3.06***	Call rate ⇒ CD yield
CD yield not cause call rate	2.10*	2.66***	CD yield ⇒ call rate
Call rate not cause bond yield	3.93***	5.68***	Call rate ⇒ bond yield
Bond yield not cause call rate	4.93***	3.70***	Bond yield ⇒ call rate

*** significant at 1% level. ** significant at 5% level. * significant at 10% level. Repo rate is the successful bidding rate at auction for maturities of one or two days.

Figure 5

Reserve accumulation ratio

In percentages

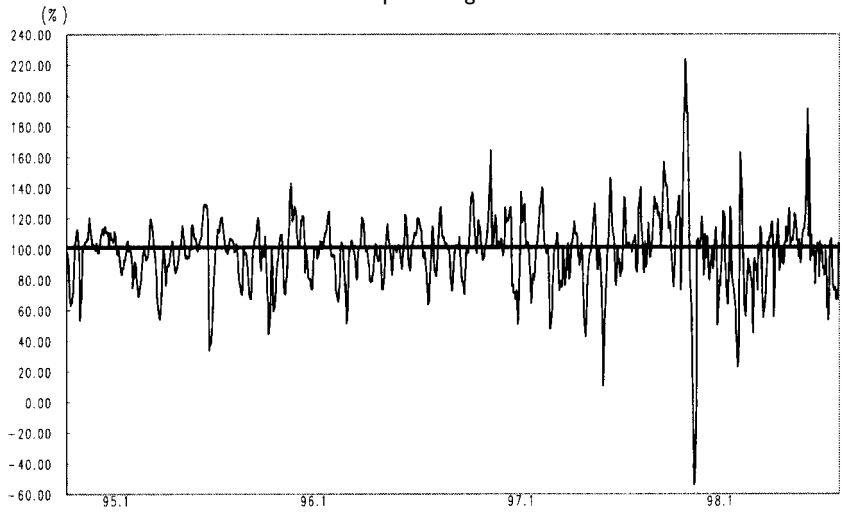


Figure 6

Repo rate

In percentages

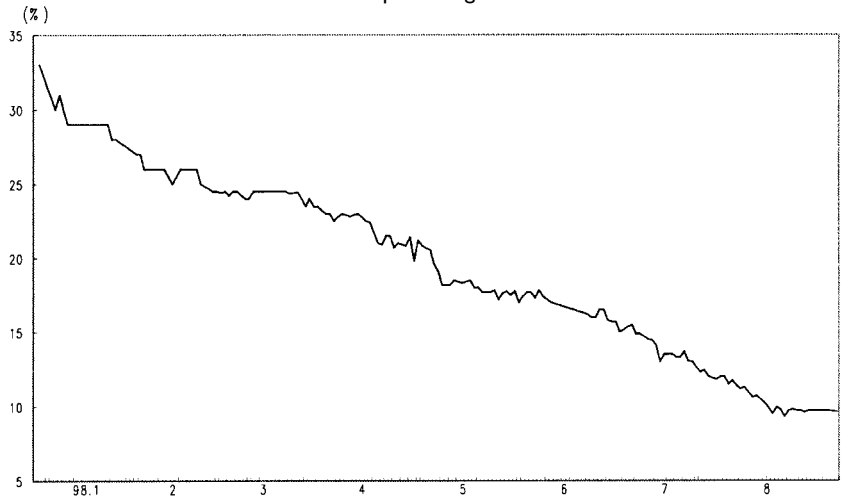
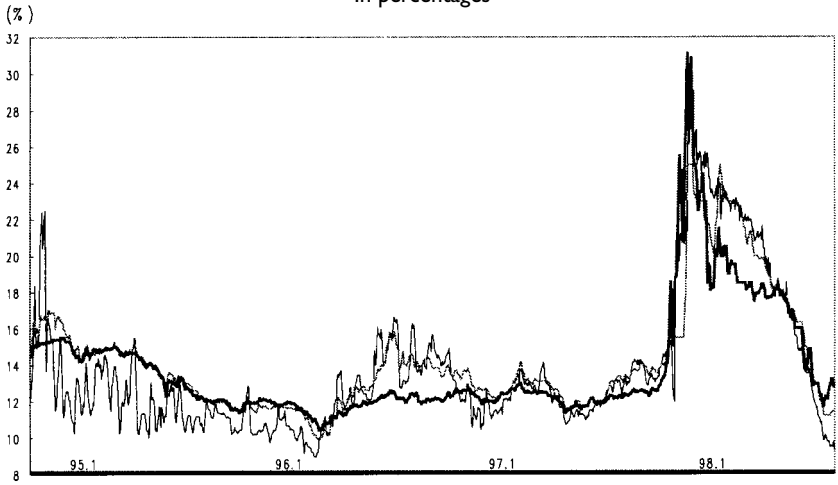


Figure 7

Market interest rates

In percentages



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