BIS

Working paper No. 35

VARIETIES OF MONETARY POLICY OPERATING PROCEDURES: BALANCING MONETARY OBJECTIVES WITH MARKET EFFICIENCY

by

Joseph Bisignano

July 1996

BANK FOR INTERNATIONAL SETTLEMENTS

Monetary and Economic Department

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ISSN 1020-0959

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Abstract

This paper reviews some of the issues confronting central banks in their choice of monetary operating instruments and techniques. As a result of efforts by governments to improve efficiency in financial systems, together with developments in financial information, computation and communication technology, central banks are having to increasingly rely on flexible operating instruments and techniques which convey in a convincing manner to market participants their near-term objectives. This has contributed to the relative decline in the importance of standing credit facilities and the greater reliance on flexible open market intervention techniques. Policy signalling and disclosure have increasingly become essential elements in short-term monetary management.

This paper was written for the conference "Central and Eastern Europe: Directing Monetary Policy Toward EU-Integration", organised by the Österreichische Nationalbank and The Vienna Institute for Comparative Economic Studies, Vienna, 26-28th November 1995.

Contents

I. Introduction[1]

The intent of this paper is to provide a broad overview of the factors which influence the choice of central bank operating instruments and procedures. The focus will be to lay out issues rather than debate the merits of alternative operating procedures.

While there has been some convergence since the early 1980s in both the longer-run and intermediate targets of central banks in industrial economies, and the ways in which these objectives are pursued, nothing like a "stationary equilibrium" can be thought to exist. All central banks can be argued to confront several generic interrelated monetary policy issues: monetary targets, information, measurement and instruments and procedures. How, for example, does the central bank measure the "tightness" of its current monetary policy? How does the central bank extract from available data the relevant information which allows it to appropriately adjust operating instruments to achieve a specified objective? What criteria are used to judge the merits of alternative monetary operating procedures? In addressing these questions central banks can be thought to be engaged in a continuous process of "learning by doing".

Changes in financial structure, macroeconomic objectives and environment have influenced the instruments and procedures central banks use to achieve both short-run, intermediate and longer-term objectives. The "transitional" nature of monetary policy, particularly in those economies undergoing rapid and substantial financial development, can be observed in a recent review of the implementation of monetary policy in Spain:

> "Accordingly, it has become *increasingly necessary* to have a *flexible monetary implementation framework* which, by acting on sufficiently *efficient money markets*, gently *guides interest rate movements, transmitting rapidly and clearly the messages imparted by the authorities* and thus contributing to a *better transmission of monetary policy*. In recent years the Banco de España had attempted to lay the basis for the attainment of these objectives. This has meant the gradual transition from implementation arrangements based essentially on the control of liquidity *to a framework in which short-term interest rates play a relevant role as an instrument variable*."[2] (Emphasis mine.)

This seemingly innocuous statement regarding the framework for the implementation of monetary policy in Spain in fact is quite revealing and one which captures the basic policy framework of many central banks. It first emphasises the necessity of having a framework for monetary policy implementation which is *flexible* and which is centred on the *money market*. While this emphasis may appear unsurprising to many, it should be recalled that we are continuing to observe further gradual

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[1] The views expressed in this paper are those of the author and in no way represent an official position of the Bank for International Settlements. My thanks to H. Bernard and A. Donaubauer for data assistance and H. Pages and O. Couseran of the Banque de France and J.C. Townend of the Bank of England for helpful information on French and British securities markets, respectively. Thanks also to C. Borio and S. Gerlach for helpful comments.

[2] Sanz and Val (1993), p. 37.

moves away from direct controls on the financial system and away from monetary policies which are, in the short run "rules-dominated". The implementation of monetary policy is seen in the above statement to "guide" interest rate movements, rather than attempting to control them strictly, or to be centred on the control of a particular reserve, monetary or credit aggregate. The elimination of quantitative controls on credit, such as the former "encadrement du crédit" in France and the "corset" in the United Kingdom, and the removal of restrictions on cross-border financial flows in most industrial countries, such as the yen swap limits in Japan in 1984, has greatly increased the potential for interest arbitrage in domestic and foreign financial markets. This trend towards "universal arbitrage" had its roots in several official studies which earlier expressed dissatisfaction with the dead-weight losses resulting from various restrictions on financial flows and prices. Two early examples are the "Report on the Money Market and Credit Conditions" by Marjolin, Sadrin and Wormser in France in 1969 and the "Competition and Credit Control" report in the United Kingdom in 1971. More recently we have seen the "Japan-U.S. Yen-Dollar Committee Report" of May 1984. A further example of the trend towards removing dead-weight losses in the financial system is the gradual reduction or complete elimination of reserve requirements in a number of industrial economies.

The trend towards universal arbitrage has also meant that the ability of central banks to influence short-term interest rates directly, and other financial prices indirectly, through intervention in the short-term money market increasingly depends on their "signalling capacity". By this is meant the ability of central banks to convey in a convincing and credible manner to market participants their near-term intentions regarding money market conditions, as well as their longer-term objectives. This signalling capacity of the central bank can be of considerable importance to the behaviour of increasingly integrated financial markets, which at times display unexpected volatility and even turbulence. One market which is especially sensitive to the signalling capacity of the central bank is the foreign exchange market, to which we devote some attention in this paper. Changes in monetary operating procedures in some cases have been made with the specific intent of improving this signalling capacity. Financial markets have been quick to react to perceptions of potential shifts in policies, possible inconsistencies in central bank objectives and constraints placed on central banks' policy as a result of government financing policies.

The considerable attention given by some central banks to the development of domestic money markets and the emphasis placed on improvements in direct operations in money markets aimed at "guiding" or "smoothing" very short-term interest rates, indicates the importance central banks place on the "information content" of their daily market activities. An obvious question is why so much attention has been devoted to what are essentially "fine-tuning" monetary policy operations. The initial point of departure of this paper is to define a framework within which to consider the factors which determine interest rate behaviour and the instruments and techniques central banks use to influence short-term interest rates.

II. Financial efficiency, risk premia and constraints on monetary policy

Improving efficiency in the financial system by increasing the degree of arbitrage possibilities between markets has arguably had the effect of undermining to varying degrees the ability of central banks to effectively control both financial quantities and prices. The standard example is the diminished usefulness of monetary aggregates as reliable intermediate target variables because of the increased substitutability of short-term nonbank financial assets with various bank deposits. Similarly, greater trade opportunities in financial assets have reduced the ability of central banks to influence certain financial asset prices, most notably exchange rates and intermediate to long-term interest rates. At times it has also constrained the timing of central bank market rate adjustments.

The problem central banks face, sooner or later, is that of making consistent their desired degree of financial market efficiency with their objectives regarding particular asset quantities and prices. For example, the deregulation and internationalisation of the Japanese financial markets, especially those resulting from the May 1984 "Japan-US Yen-Dollar Committee Report", had the rapid effect of increasing possibilities for interest arbitrage between the Japanese interbank market and the open market and between domestic and foreign short-term markets.[3] A series of liberalisation measures in Japan in the early 1980s had the result of driving more closely together the three-month bill rate, Euro-yen rate and gensaki rate, as well as the domestic 120-day CD rate.

This integration of markets can remove to a significant degree the ability of the central bank to directly influence a particular interest rate or interest rate structure. It also increases the importance of market expectations, particularly expectations of central bank intentions, in the determination of financial asset prices. In recent years, for example, the greater integration of bond markets has caused movements in long-term interest rates which have been difficult to explain by domestic factors alone. Wide swings in the long-term rates have at times induced large portfolio shifts among bank liabilities reducing the reliability of particular monetary assets as intermediate target variables.

Improvements in financial efficiency thus come at the cost of increasing the influence of at times volatile market expectations. The problem for the central bank in this environment is to make market expectations as "efficient" as possible. This means to ensure that market expectations capture and reflect all possible available information. The notion of financial market efficiency dependent on asset prices fully incorporating all available information can equally be applied to the monetary operations of central banks. Short-term and long-term interest rates will presumably contain the smallest risk premia if central banks can credibly signal to the financial markets their market intentions and if these intentions are interpreted as consistent with central bank objectives.

One can think of the formation of longer-run monetary policy objectives and the short-run implementation of monetary policy as a problem of "optimal policy signalling and information

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[3] See Bank of Japan (1985).

disclosure". For the central bank, risk premia on financial assets will be dependent on how well central banks solve the signalling and disclosure problem. As central banks may have specific objectives for certain asset prices, in particular the exchange rate, risk premia on various financial assets may be interdependent: in fact a "trade-off" among risk premia which the central bank can influence both in its choice of "policy regime" and by its solution to a particular monetary signalling problem.[4]

An example of the central bank signalling/disclosure problem is provided by the following illustration of the "tactical" problem at times faced by the Bank of Canada in which market perceptions can constrain the actions of the central bank.

> "A decision to ease monetary conditions may be delayed if the preconditions have not been established, for example, when there is a significant difference of opinion between the Bank and the market on the need for easier monetary conditions, and a delay in easing is not likely to risk undesired deflationary pressures. To do otherwise may be interpreted by the market as a shift in the goal of policy, which in turn could trigger higher interest rates in anticipation of a drop in the value of the Canadian dollar, and prevent the desired easing in monetary conditions from taking place."[5]

In this example the timing of a monetary action which does not represent a change in policy may be interpreted as such and have exactly the opposite effect as desired if "the preconditions have not been established". The tactics of a short-term adjustment in monetary conditions (interest rates) are thus sensitive to market conditions and perceptions of the central bank by the market. A risk premium in asset prices (e.g. long-term interest rates) may arise when there is a misperception of the short-term objectives of the central bank or, as in the case cited above, a difference of opinion between the central bank and the "market" over the desirability of a particular adjustment in monetary conditions.

When market perceptions and expectations can potentially shift quickly and induce undesired risk premia in financial prices, central banks may, as will be illustrated later, choose policy instruments and procedures which reduce the uncertainty over the intentions of the central bank and "guide" short-term instruments in such a manner as to reduce possible misperceptions of the particular policy action.

How shifts in expectations and risk premia complicate and constrain the monetary operating procedures of central banks depends on two broad factors; firstly, the framework in which the central bank desires to operate, for example, a reserve management or short-term interest rate framework, and secondly, the degree of efficiency of domestic and international financial market arbitrage. In fact these two elements influencing monetary operating procedures and instruments might be considered as one. Greater efficiency in financial markets, simply defined as increased potential arbitrage opportunities within and across financial markets, produced by the removal of

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4 See Ayuso (1995).

5 Zelmer (1995), p.5.

impediments to asset substitution, reduce the effectiveness and usefulness of the central bank policy framework based on reserve, monetary or credit aggregates. This often results in central banks shifting for technical reasons between alternative financial quantity targets (reserves, monetary base, M0, M1, M2, M3, ...) and eventually relegating the favourite aggregates to an "information variable" status, reducing the ability of the public to understand central bank behaviour. The element of international financial market efficiency arises as the interdependence between domestic and foreign financial markets increases and the exchange rate becomes increasingly sensitive to shifts in portfolio preferences. When a central bank cannot remain indifferent to short-term exchange rate movements, as most small open economies cannot, foreign exchange objectives or constraints may over time dictate the timing and tactics of monetary procedures and influence the choice of monetary instruments. This point will be illustrated later in this paper.

Monetary operating procedures and instruments may also change over time because of the influence on risk premia and expectations of two factors influencing domestic liquidity and interest rates, one domestic and one foreign: the financing of the government deficit and the inflows and outflows of foreign capital. Not only can the size and timing of government financing operations cause the central bank to alter its monetary operating procedures, but so may the tax treatment of government securities. In 1984, for example, the Banco de España significantly altered its liquidity control procedures, introducing Treasury note repurchase agreements in place of "monetary regulation certificates" used to drain excess liquidity. Just eighteen months later the new system of operating procedures ran into difficulty because of a change in the tax treatment of Treasury notes, reducing their usefulness as monetary control instruments.[6]

Improvements in capital liberalisation may also greatly complicate the task of monetary operating procedures, particularly when the short-term government securities market is underdeveloped, and financial instruments are insufficient to efficiently clean up a build-up of excess liquidity. This may require the central bank to issue its own paper in order to wipe up excess liquidity. These difficulties can occur even in sophisticated financial markets. In Hong Kong, for example, where monetary policy since October 1983 has been dominated by the link to the US dollar (US$1 to HK$7.8), reserve requirements are absent and there are no impediments to arbitrage between Hong Kong and the United States. Hence the Hong Kong money market is subject to potentially rapid and large shifts in international portfolio preferences. Monetary management in Hong Kong has been facilitated since June 1992 by the Hong Kong Monetary Authority's "Liquidity Adjustment Facility" (LAF). This facility operates not only in a way similar to a discount window, offering repurchase agreements against eligible securities at the offer rate, but also as a deposit facility, where surplus clearing balances can be placed at the LAF bid rate.[7] Although other central banks use different methods, we increasingly observe operating procedures which establish both a floor and a ceiling to the overnight interbank interest rate, which attempt, as noted in the Spainish reference

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6 See Sanz and Val (1993).

7 See Hong Kong Monetary Authority (1994a).

above, to "guide interest rate movements, transmitting rapidly and clearly the message imparted by the authorities".

A clear example of the task of "making consistent" the desired degree of financial market efficiency with the desire of the central bank to influence particular financial quantities or prices is the comparison of the financial deregulatory process since 1980 in France and Germany.[8] Since 1980 through a variety of measures the French government and central bank attempted to improve the efficiency of French capital markets and increase the ability of the central bank to directly influence market-determined interest rates. The result was to some extent a disintermediation of the banking system through the promotion of nonbank financial assets which competed directly with bank deposits. The efficiency of French money and capital markets, partly seen in the early spectacular growth of the French MATIF (securities futures and options market), grew accordingly. But similarly did the problem of the reliability of French monetary aggregates. In contrast, Germany saw little change, until recently, in the sophistication of short-term asset markets, although interest rates had been deregulated much earlier than in France. Commercial paper, money market mutual funds and futures and options markets were relatively slow to develop domestically, not only due to the greater caution in the public's acceptance of new instruments, but also from the official desire to preserve the information content and reliability of German monetary aggregates. As a result, Germany can arguably be said to be one of the few remaining countries which targets monetary aggregates in an active manner and which continues to display a "stable" demand for money. As a result, monetary operating procedures in Germany have changed modestly since 1980 compared with many other financially developed economies.

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[8] For the France experience, see Quintyn (1993) and Bruneel (1989). Monetary aggregates in Germany can be thought to have signalling and information disclosure content regarding the long-run intentions of the central bank while operating procedures and instruments are used to signal and disclose short-term intentions.

III. Exchange rate shocks, central bank objectives and operating procedures

As the recent adjustments in monetary operating procedures and objectives in a number of countries have shown, balancing desires for financial market efficiency with central bank objectives can be a delicate exercise, particularly in increasingly integrated financial markets subject to rapidly changing expectations and capital flows. Although the design of monetary operating procedures might be considered of second order importance, compared with macroeconomic policy objectives, such as exchange rate or inflation objectives, the ability of modern financial markets to "attack" or "undermine" these objectives requires that monetary operating procedures be designed to withstand challenges to the broad objectives of monetary policy. Thus we frequently find reference to the need to have "flexible" monetary operating procedures.

The challenge we briefly focus on here is that to exchange rate objectives, offered by the large volume of short-term capital flows from institutional investors, particularly from some countries, such as the United States, whose institutional investment still appears to be under diversified internationally. The last few years have witnessed two major currency crises in Europe, a major currency crisis in Mexico and Turkey, and lesser but serious attacks on the currencies of other countries. In this light, three questions might be asked: (a) do currency flows reflect economic fundamentals; (b) what might be the basic sources of the major currency instability; and (c) how might monetary operating procedures be adapted in light of these factors?

Although reference is frequently made to the transient nature of much cross-border capital flows, serious analysis suggests that capital flows do in fact reflect economic fundamentals. Capital flows analysed within intertemporal models of current account determination, which look at capital flows much as consumption is viewed in a permanent income theory framework, suggests that both for industrialised and developing economies fundamentals account for a large proportion of cross-border flows.[9] At the same time, however, recent work at the IMF and elsewhere suggests that although the "fundamentals" (e.g. government deficits, deregulation, privatisation, etc.) have improved among Latin American countries, these countries may be more "vulnerable" to an increase in world interest rates and to a rapid exit of capital flows than earlier.[10] This view is further supported by the work of Dooley, Fernandez-Arias and Kletzer (1994), who considered the vulnerability of 18 heavily indebted countries to the level of US dollar interest rates. Several months before the recent Mexican exchange rate crisis they concluded:

> "A reversal in US interest rates could generate real trouble for debtor countries, particularly if it spreads to domestic markets. The related fall in

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[9] See Ghosh and Ostry (1993) for an analysis of capital flows to developing countries within this framework.

[10] See Calvo, Leiderman and Reinhart (1992).

> secondary markets would signal a halt of recent capital inflows, rapid decline in international reserves and exchange rate depreciation."[11]

Recent studies thus appear to suggest that while capital flows may be structurally related to intertemporal decision-making, they are increasingly sensitive to movements in international interest rates, particularly U.S. dollar interest rates.

Given the strategic role in macro-policy formation played by the exchange rate regime, the selection of monetary operating procedures should to some degree reflect the exchange rate regime choice, particularly the potential impact of large shifts in money market liquidity. It is common for many countries attempting to reduce inflationary pressure, and without reliable monetary aggregates to act as intermediate targets, to resort to a nominal exchange rate anchor. Exchange rate stability and high domestic interest rates can be a powerful stimulant to attracting foreign financial capital. The resulting problem for the central bank has often been that of the effectiveness of liquidity draining procedures: the "sterilisation" problem.

For developing economies, economies in transition and so-called "emerging economies", focusing on how best to respond to excessively large capital inflows (and related potential outflows) may point to the "limits" of its monetary operating procedures. This points to the availability and usefulness of market-oriented vs. regulatory (administrative) tools able to alter market liquidity and to the role played by the non-bank financial sector.

Market-oriented procedures include liquidity absorption facilities with standard open market operations in government paper and special obligations of the central bank (e.g. "monetary stabilisation securities"). The standard regulatory tool is reserve requirements. In countries with little short-term government paper or poorly developed money markets, open market operations may be unavailable in the quantities needed. The resort to reserve requirements may be undesirable because of the tax it imposes on the banking system. Other measures may be taken, some which clearly reduce efficiency in the financial system if applied for long periods of time. These include the imposition of limits on banks' foreign liabilities and restrictions of various kinds on domestic residents' securities transactions with non-residents. Special arrangements are also available, such as in Malaysia, which at times has used the assets of the Employee Provident (pension) Fund to sterilise capital inflows, transferring these together with government deposits to the central bank. Singapore, too, has tried to sterilise capital inflows with the assets of the mandatory government pension fund, the Central Provident Fund.[12] Some countries have even resorted to increasing external debt service to help sterilise capital inflows. A review of country experiences with alternative sterilisation efforts suggests that their effectiveness, whether through open market intervention or increasing the restraints

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[11] Dooley, Fernandez-Arias and Kletzer (1994), p.25-26. Their study found that international interest rates, and related changes in real exchange rates and real domestic interest rates in debtor countries, explained all of the improvement in the secondary market prices of existing sovereign debt after the first stage of Brady Plan debt restructuring in 1990.

[12] Spiegel (1995) reviews the various techniques used in Asia in recent years to sterilise capital flows.

and costs on bank intermediation, also depends on the state of development of the nonbank financial sector. The more developed the nonbank financial sector, the less effective standard open market operations or restraints on banking sector activities are likely to be. Again we see the challenge the greater efficiency of the financial system creates for the ability of the central bank to control financial prices and quantities, in this case the supply of short-term liquidity created by large capital inflows.

Focusing on the problems created by exchange rate regime-dependent capital inflows is a way of considering what might be called "gross-tuning" monetary operating procedures. This aspect of central bank operations is less concerned with the signalling and policy disclosure aspects of monetary operating procedures and more with the problems created when signalling and policy disclosure activities are being tested by the market or even breakdown, as when a central bank is forced to abandon an exchange rate commitment. The desired availability of alternative monetary operating procedures and instruments is closely dependent on the exchange regime. The efficacy of these procedures and instruments needs to be judged in relation to the financial prices/rates the central bank chooses to fix, smooth or stabilise, among which the exchange rate has often been the most difficult. "Gross tuning" procedures and instruments might thus be based on the nature of the types of gross shocks which potentially hit the economy.

Financial efficiency improvements increasingly appear to challenge the ability of central banks to maintain exchange rate commitments. A recent illustration is the 1992 European exchange rate crisis. Several new financial instruments have increased the ability of market participants to take short-term highly leveraged speculative positions. One example has been the improved ability of exchange market participants to speculate against a currency with short-sales, financed with swaps obtained in the interbank market.[13] Some argue that the improved mechanisms of foreign exchange speculation put both exchange rate commitments at risk as well as the reserves of the central banks, the target of the exchange rate attack for some investors. If improvements in financial instruments and technology create greater opportunities for successful challenges to currency commitments, central banks may themselves have to consider having available more "gross and fine-tuning" techniques, including possible operations in other markets and instruments, such as forward markets and derivatives.[14] An alternative would be to hold out the opportunity of using techniques or actions which intentionally restrain or discourage certain types of foreign exchange and securities trading, such as securities, and foreign exchange transactions taxes, and even temporary restrictions on capital flows.[15] Very recently, for example, the Finance Ministry in Thailand was said to be considering a variety of measures aimed at reducing potential speculative capital inflows. These included a tax on

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[13] See Linde and Alonso (1993). Schadler, et.al. (1993) review the experience of several countries which have attempted to deter capital inflows in recent years.

[14] The issue of central bank operations in derivative markets is still a very open one.

[15] Linde and Allonso (1993) gives the example of the option of penalising or regulation of swap-financing transactions provided by banks in the weak currency country to non-residents.

currency swaps and increasing the withholding tax rate on interest income.[16] The Bank of Thailand was said to be also considering increasing the cash reserve requirement on non-resident bank accounts at finance companies, equal to those placed on similar accounts at commercial banks. Note here the importance of the development of the nonbank financial sector to the effectiveness of measures restraining the activities of banks. Increasing reserve requirements was also being considered.

Because of the importance of the exchange rate regime to countries undertaking stabilisation policies, it is important to examine what lessons economists have drawn from recent experiences and the implications for "gross tuning" monetary operating procedures. It first appears that if stabilisation programmes are based on exchange rate commitments central banks will have to find a compromise between the exchange rate objective and the objective of financial market efficiency. Before this compromise is confronted, however, it may be useful to have a measure of the sustainability of the exchange rate commitment.[17] A review of exchange rate attacks of recent vintage show them to have three common features – the importance of the real exchange rate, the ability of open capital markets to magnify the cost of the currency collapse, and the speed with which the attack and currency collapse can occur.[18] Kamin and Rogers (1996) argue that an appreciating real exchange rate and rising current account deficit are noticeable in almost every exchange rate based stabilisation programme. Moreover, "in the initial phases of a credible stabilisation programme, responsible monetary policy may consist of no more than appropriate sterilisation of capital inflows to prevent monetary conditions from loosening too quickly. The monetary authorities may find it difficult to adjust, for inertial as well as political reasons, to the greater demands posed by speculative attacks in the later stages of an exchange rate based stabilisation programme, when an active and potentially painful tightening of monetary policy may be required".[19]

It should not go unnoticed that while sterilisation efforts may be thought of as an essential part of a stabilisation program, they may also contain seeds which later work to undermine it. Attempts to insulate the supply of domestic liquidity from large capital inflows through sterilisation programs which increase the supply of domestic debt can lead to high future financing needs and higher expected taxation. The larger public debt may itself create expectations of greater inflation, an expectation supported by the correlation between public debt and inflation in many countries.[20] These expectations may be magnified when sizeable portions of domestic debt are held by non-residents, facilitated by a relaxation of capital controls and a liberalisation of the financial system.

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[16] See "Thailand may curb inflows of capital", Financial Times, 12 March 1996 and "Capital inflows push Thais into policy dilemma", Financial Times, 13 March 1996.

[17] The Spanish central bank has, for example, constructed measures of market confidence in the sustainability of its ERM fluctuation banks. See Ayuso, Jurado and Restoy (1993).

[18] Two useful surveys of currency crises are Dornbush, Goldfajan and Valdés (1995) and Kamin and Rogers (1996).

[19] Kamin and Rogers (1996), p. 23-24.

[20] See Calvo (1991) for the details of this argument.

Again we return to a theme of this paper: to what primary objective is the design of monetary operating instruments and procedures directed? Efficiency in the financial system may point to the creation of liquid and deep money and bond markets, few indirect taxes or portfolio constraints on the banking system, low securities transaction costs, the growth of nonbank financial intermediaries and few constraints on capital movements. But these very factors which increase efficiency in the financial system may undermine the ability of the central bank to effectively employ a required nominal anchor. Given the improved structure of financial intermediation, the over-attachment to a particular nominal anchor may invite market participants to periodically test its credibility, having the unfortunate effect of causing the central bank to compromise its financial efficiency objective, for example, with a reimposition of restraints on capital flows or taxes on certain securities transactions. Monetary operating procedures should not be chosen independently of the broad financial objectives of the central bank and with some understanding of the sustainability of these objectives.

This unavoidably raises the related issue of the desirability of central banks using the exchange rate as the nominal anchor and the merits and costs for countries of potentially having to resort to some forms of capital controls to defend the exchange rate. This is too important and complex an issue to be treated lightly here and one on which much has been written. Nonetheless, it should be mentioned that greater cross-border capital flows by institutional investors with enormous resources have softened the enthusiasm in some official institutions for the unqualified endorsement of unrestricted capital mobility and the use of rigid exchange rate commitment as a nominal anchor.[21] Compromises on exchange rate commitments (e.g. wider exchange rate fluctuation bands) and limited restrictions on some types of capital flows are examples of the need to balance central bank long-term policy objectives with their desire to improve the efficiency of financial markets.

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[21] See Truman's (1996) review of the implications for international finance of the Mexican peso crisis and the 64th Annual Report 1994-95 of the Bank for International Settlements, p. 210. Truman emphasises the need in a world of globalised capital markets for countries to develop their own "early warning systems" in order to anticipate potential domestic and external shocks such as occurred in the recent Mexican peso crisis. The Banco de España has done just that. Ayuso, Jurado and Restoy (1994) have constructed an exchange rate indicator for countries using exchange rate target bands which incorporates the possibility of less than perfect credibility of the target bands.

IV. The trend in monetary operating procedures: reserve requirements and the structure of the interbank market

The cornerstone of the central bank's influence on economic activity and prices is its ability to alter the cost and availability of very short-term "liquidity", specifically the payments clearing balances of those financial institutions, primarily banks, required to "settle" payments on the books of the central bank. Thus the first topic to address regarding the structure of monetary operating procedures is the source of the demand by the financial system for central bank reserves.

The source of the demand for central bank money is essentially for clearing balances. However, both for monetary control and prudential reasons, in the past many central banks have imposed an indirect tax on intermediation via the banking system by requiring banks to hold reserves as a given percentage of their liabilities. Both the types of liability and the rates applied to them have varied across countries and over time.

A debate has persisted for many years among central banks regarding the appropriate level of reserve requirements for monetary control purposes. Some have argued that the simple demand for central bank clearing balances was sufficient for the central bank to influence short-term liquidity and interest rates in the interbank market, assuming the demand for reserves was stable. Any enforced demand for reserves above needed clearing balances was said to be a tax on bank intermediation. Some also have suggested that this "tax" was required to offset the implicit subsidies provided by non-priced central bank services or services that were provided at below-market rates. This tax, however, could potentially favour the growth of nonbank financial intermediaries or push deposits into competing markets where reserve requirements were absent. In some countries reserve requirements were kept higher than necessary clearing balances for the revenue they produced for the central bank and the government. Often neglected in this debate was the argument raised by some academics that there exists an optimal level of reserve requirements which can minimise price level variability.[22]

The Banco de España provides an example of why reserve requirement were held quite high between 1984 and 1990; the legal reserve requirement was 19.5%, 2.5% points non-interest bearing and the remainder yielding a below-market rate. Firstly, high reserve requirements helped to automatically sterilise monetary base creation arising from two sources: the financing by the Banco de España of part of the government budget deficit and the expansion in the central bank's foreign exchange reserves arising from large capital inflows. Secondly, the Banco de España is quite open in admitting that during this period the return on required reserves was significantly below money market interest rates and represented a "disguised tax on banks to finance the deficit", since the profits accruing to the central bank were returned to the Treasury.[23] Reserve requirements thus served both as a tool for monetary base sterilisation and government taxation.

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[22] See Siegel (1981).

[23] Sanz and Val (1993), pp. 40-41.

In recent years changes in the level of reserve requirements and the rules governing their calculation and settlement have occurred reflecting two aspects of monetary operating procedures mentioned above: improving the efficiency in the financial system and increasing the signalling/disclosure aspect of central bank monetary operations. Reserve requirements have been lowered in many industrial countries, in some cases to zero, and administrative changes have occurred which were designed to reduce the volatility of interbank market interest rates, thus improving the signalling capacity of the central bank. Table 1, taken from a recent study by the Bank of Japan (1995) on the reform of reserve requirements in the major industrial countries, lists the reasons for recent changes. Since 1990 reserve requirements have been reduced in all of the major (G7) industrial countries (the "cash ratio" in the case of the United Kingdom). Note that the primary objective of the reduction in reserve requirements, although worded differently for different countries, has been that of reducing the "burden" ("distortions", "inequality") on depository institutions. In 1993 and 1994 the Deutsche Bundesbank reduced reserve requirements in order to curtail the outflow of domestic deposits to the Euro-markets, which also can be interpreted as improving the competitiveness of domestic intermediation. The reduction of reserve requirements by the U.S. Federal Reserve in 1990 was quite explicitly undertaken with the objective of increasing the "competitive equality" among financial institutions.[24]

The relevance of the tax represented by reserve requirements is dependent on the competition facing depository institutions subject to them, on the level of interest rates and on the ease and attractiveness of placing deposits in other countries. Although the "tax" implied by reserve requirements is small in some countries, it is not trivial. It has been estimated for the United States that the foregone interest to depository institutions during 1992, assuming a 3% federal funds rate, on required reserve balances of $23.5 billion, was roughly $700 million.[25]

One can observe the tension between the objective of eliminating the distortional effects of reserve requirements and the desire of the central bank to induce stability in interest rates in the interbank market. One argument against the complete elimination of reserve requirements has been the possible increase in rate volatility in the money market. To avoid the distortions caused by reserve requirements, some argue in favour of paying interest on reserves.

The reduction in reserve requirements to very low levels raises a set of issues which can only be mentioned here in passing. These include the effect which reserve requirements (average and marginal) might have on the size, frequency and type of market operations needed to achieve desired short-term interest rate behaviour in the money market. Reserve requirements can also be viewed in the context of their use when there is a sudden drain of liquidity caused by the central bank selling its foreign assets in order to support its currency in the exchange markets. A shortage of collateral, for

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[24] Feinman (1993) details the history of reserve requirements in the United States and the competitive arguments for their reform.

[25] Feinman (1993), p. 571.

example, may make it difficult for the central bank to replace the loss of reserves by open market operations.

Table 1
Objectives of recent changes in reserve requirements ratios in major industrialised countries*

Country		**Objectives**
Canada	June 1992	To address the issue of competitive equity of imposing non-interest-bearing reserve requirements on banks and not on other deposit-taking institutions.
France	October 1990	To prevent the shift of domestic funds to Euro-deposits.
	December 1991	To offset the effect of monetary tightening caused by the intervention rate increase in November 1991 to defend the French franc.
	May 1992	To stimulate the economy without depending on lowering interest rates, considering the impact on the exchange market.
Germany	March 1993	To prevent the shift of domestic funds to Euro-markets by reducing the reserve burden.
	March 1994	Same as above.
Italy	February 1993	To reduce the reserve burden.
	July 1994	To reduce the reserve burden.
Japan	October 1991	To facilitate smoother and more efficient monetary operations.
United Kingdom	January 1992	To ease the reserve burden on commercial banks, due to the Bank of England's cost-reduction efforts.
United States	December 1990	To strengthen competitiveness of subjected financial institutions and to activate lending by reducing costs of depository institutions.
	April 1992	To activate lending by reducing costs of depository institutions.

* All revisions are a lowering of reserve requirement ratios or a reduction of the reserve burden.

Source: Bank of Japan, Quarterly Bulletin, May 1995.

A second aspect of changes in reserve requirements administration since the 1980s have been provisions which improve arbitrage in the interbank market, with the effect of reducing volatility in interbank interest rates. These include averaging provisions for required reserve calculation over a specified holding period and special carry-over provisions when actual reserves exceed required ones. Although the reduction in reserve requirements in some countries has increased volatility in overnight interest rates, changes in the way reserve requirements are calculated and settled have tended to dampen short-term interest rate volatility, improving the signalling content of policy adjustments by the central bank.

Although adjustments in reserve requirements are for the most part not often used as active tools of monetary management in most industrial countries, at times high marginal reserve requirements on banks' foreign liabilities have been employed to discourage capital inflows. We still observe the active use of reserve requirements in Asia and Latin America to sterilise capital inflows, as well as high marginal reserve requirements on banks' foreign liabilities.

Given its monopoly over the supply of reserves, the central bank has the choice of controlling either the quantity of reserves or the price at which they are traded, the short-term interbank rate. The efficiency with which it can control either the quantity of reserves or their price depends both on the instruments available to the central bank, that is, the factors which influence reserve supply, and on the determinants and stability of reserve demand. Considering reserve demand, the structure of the interbank market and the efficiency of reserve settlement between banks will influence the aggregate demand for reserves and the timing of this demand.

Almost universally central banks place greater emphasis in the short run on ensuring stability in the interbank rate than on controlling the quantity of bank reserves.[26] The stability in short-term money market rates will depend on the management of the interbank clearing system and the tools and procedures available to the central bank for operating in the money market.[27] In fact, the latter are quite dependent on the former: a change in the interbank settlement system will usually require changes in the way the central bank operates in the interbank market. For example, stability in the interbank rate requires that there be flexible means by which temporary reserve needs can be rapidly accommodated by the central bank. This may occur through borrowing directly from the central bank via collateralised lending (a discount window or other standing credit facility), through overdraft facilities or implicit lending via the "float" generated by the payment system. The means by which the demand for reserves can be accommodated will be dependent on the rules of reserve accounting (averaging provisions, contemporaneous or lagged reserve accounting, carry-over

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[26] See Kneeshaw and Van den Bergh (1989) for details.

[27] Changes in 1989 in the Italian system for the clearing and settlement of interbank transactions dramatically improved the efficiency of the interbank market in Italy and improved the ability of the central bank to influence interest rates and the money supply. See Banca Commericale Italiana (1994). Very recently China introduced an electronic interbank money market, which is expected to establish national interest rates for short-term money, where previously there has been wide variation in regional short-term interest rates.

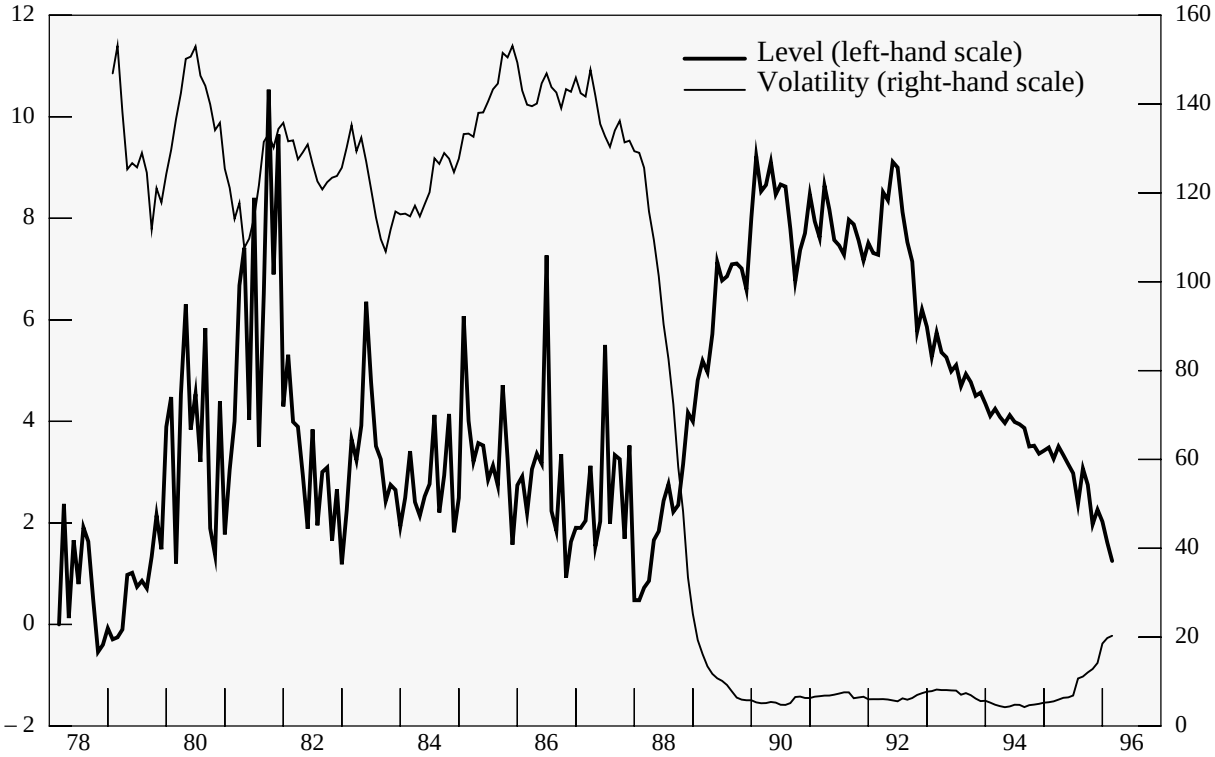
provisions) and the nature of the interbank settlement system (e.g. discrete time net settlement or real-time gross settlement systems).

An example of the importance of the interbank settlement system is the Swiss National Bank's 1988 introduction of an electronic payment system for interbank settlements together with new liquidity rules. These two changes were followed by an unexpected *decline* in the demand for central bank money and, arguably, a more *expansionary* monetary policy than had been desired. The demand for reserves became difficult to forecast. Prior to 1988, reserve requirements were enforced only on the last day of the month. Consequently the pressures in the interbank market on the final settlement day caused short-term interest rates to rise significantly. This seasonal pattern in short-term rates came to be known as the "ultimo effect". The switch to lagged reserve accounting with enforcement over an averaging period caused the seasonal pattern in interest rates to disappear and, as seen in Chart 1, substantially reduced volatility in the day-to-day rate.

Chart 1

Switzerland

Day-to-day money rate, level and volatility*



* Euromarket rate, "tomorrow-next". Volatility is measured as the twelve-month moving average of the standard deviation of daily percentage changes during calendar months.

An illustration of central bank management of interbank interest rates is provided by the Hong Kong Monetary Authority (HKMA), which recently adopted new monetary operating procedures, switching from using the level of interbank liquidity as its operational target to interbank interest rates. The overall objective of managing liquidity (clearing balances of licensed banks) was to ensure exchange rate stability. Prior to March 1994 the HKMA changed the level of interbank liquidity only infrequently – 30 times between July 1988 and March 1994. However, the "announcement effect" created by a change in interbank liquidity gradually declined with the growth in interbank market turnover. In addition, in conducting monetary operations the HKMA noticed that there was a lack of stability in the relationship between the level of interbank liquidity and interbank interest rates, reflecting short-term adjustments in the demand for interbank funds. Arguing that the exchange rate was more directly influenced by interbank interest rates than by the level of interbank liquidity, the HKMA adopted interbank interest rates as its operating target.[28] The economics of the change in operating procedures is straightforward.

Instead of fixing the supply of interbank liquidity and having shifts in interbank liquidity demand reflected in movements in the overnight HIBOR (Hong Kong Interbank Offer Rate), the HKMA adjusts liquidity supply in the face of demand shifts in order to keep the overnight HIBOR within the bid and offer rates provided by its Liquidity Adjustment Facility (LAF).[29] What is notable in the adjustment in operating targets and procedures of the Hong Kong Monetary Authority is the emphasis on the transparency of the interbank interest rate objective and the efficiency with which the central bank adjusts interbank liquidity to satisfy this objective. The success of the change in monetary operating procedures is noted in the 1994 Annual Report of the Hong Kong Monetary Authority: "Along a general rising trend, movements in the overnight HIBOR were largely kept within the corridor set by LAF rates. The success of monetary operations in reducing the volatility of the overnight HIBOR contributed to the stability of the HK dollar exchange rate."[30]

With the reduction in reserve requirements in a number of countries to very low levels or to levels close to those needed by depository institutions for settlement purposes, the importance of the system of clearing and settlement of interbank transfers has increased. In recent years official institutions have focused on the risk of settlement failure in large-value interbank funds transfer systems, particularly on the potential problems created by the settlement lags in discrete-time settlement on a multilateral basis.[31] These concerns have caused a number of central banks to recommend the move to so-called "real time gross settlement systems", meaning that interbank payments will be settled continuously during the working day rather than at discrete intervals, such as

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[28] See Hong Kong Monetary Authority (1994a).

[29] Liquidity is provided via repurchase agreements of eligible securities; the range of eligible securities was widened with the change in the operating target in 1994.

[30] Hong Kong Monetary Authority Annual Report 1994, p. 20.

[31] Borio and Van den Bergh (1993) provide an overview of many of the issues related to the management of payment system risk.

at the end of the day. The Bank of England, the Bank of Canada and the Hong Kong Monetary Authority, to name just a few, have all recommended the transition to real time gross settlement systems.[32] The European Monetary Institute is also anticipating the use of the RTGS system in the countries which adopt the single currency at the start of Stage Three of European Monetary Union. A possible consequence of RTGS systems is the need for greater intra-day liquidity. Although the necessary increase in the amount of intra-day liquidity is open to debate, central banks are examining alternative ways of providing greater intra-day liquidity, for example, under same-day sale and repurchase agreements.[33] It is open to question whether and in what way the RTGS systems will influence the behaviour of the overnight interbank rate.

This section has drawn attention to the origins of the supply and demand for very short-term liquidity and some of the factors which influence the price of this liquidity. Again we see that central banks have had to strike a balance between improving efficiency in the financial system, for example, by improving the functioning of the interbank market and the interbank settlement system, with their monetary operating objectives, which increasingly has focused on the management of overnight interbank interest rates.

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[32] See Bank of England (1994), Hong Kong Monetary Authority (1995b) and the European Monetary Institute (1996).

[33] Dale and Rossi (1996) consider the issue of an interbank market for intra-day funds that might emerge in the United Kingdom as a result of real-time gross settlement.

V. The structure of domestic financial markets and central bank standing credit facilities

A useful vantage point from which to view differences among central banks' use of alternative monetary instruments and operating procedures is the structure of their financial markets; in particular the availability of short-term public and private financial assets and the structure of the market for these instruments. This vantage point may help to understand why some central banks have chosen particular operating targets and to encourage or not the growth of particular financial instruments and markets. This will also help to understand why at times certain activities of central banks may appear to contradict earlier objectives for the development of domestic financial markets, for example, the encouragement of foreign participants in domestic markets and the development of new instruments such as futures, swaps and options.

Central bank encouragement of the development of short-term money markets has typically been based on the desire to expand arbitrage opportunities, both between the interbank and open markets domestically and between domestic and overseas markets. This has been done to enhance the efficiency of domestic financial markets and improved the ability of the central bank to transmit desired changes in short-term rates along the term structure, thereby influencing the demand and supply of money and credit and real economic behaviour. For example, the Bank of Japan earlier suggested that the modest availability of short-term government debt limited its ability to conduct monetary operations.

> "As an instrument of credit absorption during a period of surplus funds, the Bank of Japan has sold short-term FBs (government finance bills) at market rates since May 1981, and the degree of freedom concerning the timing and amount of such sales has increased gradually. Nevertheless, the FBs market has not yet expanded sufficiently to enable the execution of buying operations."[34]

Not all central banks are in agreement that a large and liquid money market is necessary for the efficient conduct of monetary policy, either for major reserve expansion or absorption operations, or for operations designed to influence short-term interest rates. The Bundesbank, for example, conducts monetary operations without the benefit of a large and liquid market in short-term government securities. In 1993 the Bundesbank introduced a new operating instrument, "Bullies," liquidity paper which was legally Treasury discount paper, giving the central bank the ability to absorb excess liquidity both from banks and nonbanks.[35] Their use was later discontinued so as not to encourage the growth of money market mutual funds, only recently permitted in Germany, because of the indirect impact the growth of such funds might have on the behaviour of monetary aggregates used by the central bank as intermediate targets.

In some countries without well developed short-term securities markets, domestic liquidity has been managed by central bank activity in the foreign exchange market, in particular with

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[34] Suzuki, Kuroda and Shirakawa (1988), p.8.

[35] See Laurens (1994).

the use of foreign exchange swaps. Although Switzerland is the only country which relies heavily on foreign currency swaps to manage bank reserves, given the absence of a market in short-term government debt, a number of central banks utilise foreign exchange swaps in the management of short-term interest rates.[36] In theory, there is no reason foreign exchange swaps should not be as efficient in influencing bank reserves and fine-tuning short-term interest rates as operations in short-term government paper. The preference of one over the other probably depends on the depth of the particular market, the number and types of participants in the market and the flexibility of the alternative operating instruments.

The growth of money and foreign exchange markets and the development of short-term financing instruments, in particular repurchase agreements, have reduced the reliance in a number of countries on standing credit facilities (e.g. discount and lombard credit facilities). The reason behind the greater use of open market operations at the expense of standing facilities to manage interbank interest rates probably has more to do with the *stability* of the demand for reserves than with the depth of any particular market per se, and the frequency of intervention required of the central bank to stabilise the interbank rate. To the extent that lower reserve requirements make it more difficult for the central bank to anticipate the demand for bank reserves, the more frequently the central bank may be required to intervene in the open market to manage the interbank rate. Hence the preference of central banks for market instruments and procedures which permit a flexible and more market-oriented management of the interbank rate – improving the "signalling" of central bank intentions when desired. For example, the Bank of England, with low cash requirements for banks, typically intervenes more frequently in the money market to achieve its interest rate objectives, compared with the German Bundesbank, which in the past has had much higher reserve requirements. Similarly, Belgium, which has no formal reserve requirements, and France, now with lower reserve requirements than previously, both intervene frequently in the market. The choice of monetary operating instruments used to achieve interbank interest rate objectives is thus partly influenced by the stability and forecast ability of the demand for reserves, partly determined by the level of reserve requirements.

Although the use of central bank standing facilities for the supply and withdrawal of reserves has declined since the 1980s, there still remain considerable differences between industrial countries. The discount window is used in the United States to satisfy minor reserve adjustment needs at banks (at a below-market rate) but is used as a major reserve supplying tool in Germany. In 1994, for example, direct central bank lending (discount and lombard credit) by the Deutsche Bundesbank as a percent of its total assets was 20% (average of month-end figures), compared with 11% in Japan, 2.5% in Switzerland and 0.1% in the United States, as seen in Table 2. Outside of Germany and Japan the bulk of central bank standing facilities is used to satisfy very short-term (overnight) reserve needs.

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[36] On the use of foreign exchange swaps by central banks see Hooyman (1993).

Table 2

Central bank lending as a share of central bank assets

Annual average of end-of-month observations

	1985	1988	1991	1994
United States	0.7	0.9	0.1	0.1
Japan	8.4	13.6	12.1	10.8
Germany	29.4	22.5	25.0	19.8
Canada	7.4	2.2	2.0	1.5
Switzerland	9.9	0.9	1.2	2.5

Sources: B. Kasman (1992), p.16 and BIS estimates.

The quantity and manner in which reserves are provided depends not only on central bank facilities but also on the activities depository institutions are able to conduct with the nonbank public which influence reserve demand. A current issue here is the use of security repurchase agreements by banks with the nonbank public. The ability of banks to engage in security repurchase agreements with the nonbank public can effectively reduce reserve requirements, as a deposit is turned into a collateralised loan to the bank, backed by the securities, subject to repurchase. This market has grown rapidly in recent years in a number of countries, both at the wholesale and retail level. The French repo market, largely wholesale, is supported by the Banque de France and backed up by explicit legislation.[37] The Italian repo market, in contrast, is largely retail and driven by tax considerations. In early 1996 a major liberalisation of the United Kingdom gilt market took place. Beginning 2 January 1996 "there will be no official restrictions on anyone repoing, lending or borrowing gilts for any purpose, either directly or indirectly through an intermediary. The reform will therefore extend choice. By doing so, it should help to increase the demand for gilts and enhance the *liquidity* and *efficiency* of the gilt market. If successful, this should over time reduce the cost to the government – and hence the taxpayer – of servicing the natural debt"[38] (emphasis mine). Again we note another change in permissible market activity designed to increase financial market efficiency, a change which could have an impact on the organisation of the money market and on the monetary operating procedures of the central bank. In contrast, repurchase agreements in the market, that is, as opposed to those with the central bank, are little developed in Germany, since market repos are still reservable liabilities of banks.

The issue of the growth of repo markets in government securities is important not only in its own right as a rapidly growing market but also with respect to the problems or benefits they present to central banks. In Germany the fact that repos on German "bunds" are subject to minimum reserve requirements has resulted in pushing the repo market abroad: the majority of repos on

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[37] Regarding the mechanics and legal framework of French repurchase transaction, see De Lapasse.

[38] Bank of England (1995). See also Plenderleith (1995) on the benefits expected from the new open Gilt repo market. A good review of the repo market is Irving (1995); on their use in Canada see Morrow (1994).

German bunds occur in London. In contrast, the Spanish repo market has flourished since the Banco de España started to issue Treasury bills in 1987. In Germany there still is relatively little government debt with an initial short-term maturity.

The generic issue here is how liquidity is provided by the central bank and how market developments, repos being one example, influence the demand for liquidity from the central bank. Typically, economists think of a "dichotomy" in the provision of central bank liquidity between open market operations and standing credit facilities, such as "rediscount" or "lombard" facilities.[39] It may be of second-order importance whether central bank liquidity provision is via an open market operation or a standing credit facility, if the standing credit facility involves collateralised lending. However, operating procedures which aim to "smooth" or "manage" overnight interest rates may be more efficiently conducted using open market operations, such as short-term repo operations with the central bank – at the initiative of the central bank or/and of the depository institution – than with standing credit facilities.

We might think of a "second dichotomy" in the provision of central bank liquidity. The first relates to standing credit facilities and outright open market operations for the provision of the bulk of liquidity needed by depository institutions, while the second dichotomy relates to procedures which provide temporary liquidity (liquidity "safety valves") and permit the central bank to guide overnight or slightly longer-term interest rates in a desired direction. In this second dichotomy central banks increasingly use procedures which set a minimum and a maximum to the overnight rate; for example, by making available discount window lending and deposit facilities, and with "fine-tuning" market operations (e.g. repos) guide the overnight rate within the interest rate corridor. In Germany, for example, the interest rate "tunnel" or "corridor" is established by the discount rate (floor) and the lombard rate (penalty rate ceiling). Lombard credit is made available to satisfy temporary liquidity needs, while discount credit, through a quota system, provides a sizeable portion of total reserve needs. Discount credit of the Bundesbank can amount to as much as twenty-five percent of the total assets of the central bank. Repurchase agreements are used to manage overnight interest rates between the discount and lombard rates and vary depending on banks' use of the lombard facility.

In contrast to the procedures used by the Bundesbank, the Banque de France ceased using a rediscounting facility in 1971, following recommendations of the 1969 report by Marjolin, Sadrin and Wormser, which emphasised the use of market intervention and interest rate determination.[40] The Banque de France's intervention is in the form of repurchase agreements. This form of collateralised lending is often backed by Treasury bills, which can be efficiently transferred to the Banque de France through the SATURNE Treasury bill clearing system. Repurchase transactions can also be

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[39] On this point see King (1994).

[40] See Icard (1994).

collateralised by commercial paper or other credit instruments with an initial maturity of less than two years.[41]

The interest rate tunneling operations conducted by the Banque de France, both to establish the floor and ceiling rates, are in the form of a repurchase tender facility and five to ten-day repurchase agreements. In principle, these facilities can be compared to standing facilities in establishing floor and ceiling rates. Repurchase tenders are announced by the Banque de France, which invite primary market operators to offer bids. The liquidity provided is expected to satisfy the "autonomous" factors influencing bank liquidity needs. On the other hand, the interest rate on five to ten-day repurchase agreements is established by the central bank, and made available to any financial institution requesting additional liquidity. The five to ten-day rate thus establishes the upper bound on short-term market interest rates. Although this facility permits banks to satisfy temporary reserve needs, it is limited by the availability of eligible collateral. Furthermore, the central bank can suspend the facility, as it did twice during 1993. Otherwise, market interest rates would be expected to move between the two official rates established by the repurchase tender and the five to ten-day repurchase agreements. To "fine-tune" the money market, the Banque de France conducts overnight repurchase agreements.

Even with the increasing sophistication of central bank operating procedures, we still observe some tension between central bank monetary objectives and pressures for greater financial market efficiency. Several central banks argue that in the absence of reserve requirements the interbank overnight rate is likely to display considerable undesired volatility. Hence when the Banque de France introduced new intervention procedures in 1987, it established a reserve ratio of 5% on sight deposits and a ratio of 1% on other deposits. These reserve requirements, however, met with some difficulty. According to Icard (1994):

> "As the increasing internationalisation of markets and the lack of harmonisation between regulations prompted operators to relocate their transactions in other countries, the reserve ratio to CDs had to be lowered to 0.5% in October 1990. The last movements in the reserve ratio to sight deposits were a decrease to 4.1% in December 1991, and to only 1% in May 1992."

One can see the tendency to conformity in terms of operating procedures as well as the desire to preserve reserve requirements because of the stability they may create in reserve demand, in the following statement by Bundesbank President Tietmeyer (1994):

> "The Bundesbank has long considered open market policy, in the form of securities repurchase transactions, to be at the centre of ongoing money market management...In light of our own experience, it also seems to be appropriate to supplement ongoing money market management by an

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[41] An important issue is what instruments can qualify as "eligible securities" for repurchase operations. In the United States, for example, only Treasury securities can be used for repos with the central bank. The use of private paper entails a credit risk and hence requires credit risk analysis.

> instrument which acts as a safety valve in the money market and sets an upper limit to interest rate swings. It could be modelled on the lombard rate, which is familiar in Germany. By contrast, it will no doubt be more difficult to gain support for the discount instrument...Above all, we consider minimum reserve requirements to be an essential instrument for efficient monetary policy. In line with their present day, more regulatory character, they create the basis for the use of the other monetary policy instruments. The minimum reserve instrument ensures that the demand for central bank money is sufficiently stable and, if appropriately designed, it serves in the money market as a liquidity buffer that offsets unforeseen fluctuations in banks' liquidity needs. The result is an indispensable steadying of general interest rate movements, also in macroeconomic terms."

This brief review of standing credit facilities and related market intervention procedures is meant to illustrate the increasing number of similarities among central banks in monetary operating instruments and procedures, with all central banks having to find the correct balance between what they think is the preferred set of monetary operating procedures and those which are feasible given market forces.[42] It should be evident that the system of monetary operating procedures adopted by central banks has changed over time in an adaptive manner, subject to the particular stage of financial development, the structure and needs of government finance, the exchange rate system, the competition in domestic financial markets, and the "philosophy" of financial development, that is, the desire to promote an efficient financial system without undermining the achievement of intermediate objectives. Clearly more efficient financial systems, with few if any restrictions on access to instruments, markets, and investment techniques, have at times undermined some central banks' ability to use monetary aggregates as intermediate targets, to establish particular exchange rate arrangements and to influence certain financial asset prices. The problem is how best to find the optimal trade-off between financial market efficiency and central bank objectives.

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[42] For example, in recent years Italian monetary policy implementation has shifted in the direction of the German model. See Banca Commerciale Italiana (1994).

VI. Responding to unanticipated shock: repos and the need for greater interest rate flexibility

The common trend observed among central banks in industrial countries with regard to monetary operating procedures has been the gradual decline in the use of reserve requirements and standing credit facilities and the greater dependence on central bank operations in open markets. In place of outright purchases and sales of securities we have increasingly observed the expanded central bank use of repos (repurchase and reverse repurchase agreements) in the management of liquidity and very short-term interest rates.[43]

Repos are the preferred instrument of many central banks for the extreme flexibility they provide with respect to maturity and the variety of collateral they can be employed with. They are used both for longer-term reserve injection or absorption operations and for very short-term fine-tuning of the day-to-day money rate. One should be aware, however, that a minor "revolution" is taking place in the use of repos outside of central bank operations, in part for similar reasons, and that they provide market participants with considerable flexibility in borrowing securities and in obtaining short-term liquidity. The growth of repos has considerably transformed the interbank market in some countries. Repos are first of all a form of collateralised lending. With the greater sensitivity to credit risk in the interbank market, repos have come to take the place of a good portion of uncollateralised interbank lending. Borrowing with collateral is marginally less expensive than without collateral; thus there is a spread between repo and uncollaterised interbank lending rates. One can see that the use of government securities-backed repos would help to further integrate the money market and the government securities market. The integration of the two markets has increased the efficiency of the interbank market in a number of countries and, some argue, has improved the ability of the central bank to "signal" to the markets its intentions, and even affect the transmission of monetary policy to the real economy.[44]

A further increase in financial market efficiency derived from repos has come from their use by non-residents. A particular example of non-resident activity is that of the Spanish government bond market. Substantial non-resident activity in this market is argued to have improved its liquidity, competitiveness and maturity and at times to also have had less a favourable influence on market volatility.[45] Repos have been one of the primary means of non-residents managing their portfolios in Spain. Their use by non-residents is argued to have increased the demand for medium and long-term Spanish government debt, helping to raise its price.

While the growth of repos has on average improved the efficiency of some interbank and government securities markets, their use by non-residents is another illustration of how the greater

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[43] For a review of trends in central bank objectives and operating procedures, see Goodhart and Viñals (1994) and Brown (1995).

[44] See Banca Commerciale Italiana (1994).

[45] Quirós (1995) provides a useful review of non-resident activity in the Spanish government bond market and the role of repos.

integration of domestic with foreign financial markets can at times spread and magnify certain disturbances, the European exchange rate crisis of 1992 and the Mexican peso crisis of 1995 being just two recent examples. Table 3 illustrates the very large and rapid growth in cross-border securities transactions. Gross purchases and sales of securities between residents and non-residents in Italy, for example, have increased from roughly 27% of GDP in 1990 to 251% of GDP in 1995. The Group of Ten (1993) has recently drawn attention to the large cross-border portfolio investment of institutional investors, the speed with which securities selling pressure can at times develop and the manner in which exchange rate pressures can rapidly move from one currency to another.

Table 3

Cross-border transactions in bonds and equities[1]

	1975	1980	1985	1990	1991	1992	1993	1994	1995
	as a percentage of GDP								
United States	4.1	9.0	35.1	89.0	95.6	106.6	128.8	131.1	101.1[2]
Japan	1.8	7.7	63.0	120.0	91.9	71.8	77.8	60.0	66.2
Germany	5.1	7.5	33.4	57.3	55.6	85.2	170.8	159.3	168.3
France	n.a.	n.a.	21.4	53.6	78.7	121.8	186.8	201.4	162.7[3]
Italy	0.9	1.1	4.0	26.6	60.3	92.1	191.9	206.8	250.9
Canada	3.3	9.6	26.7	64.4	81.3	113.2	152.9	209.7	174.7[4]

[1] Gross purchases and sales of securities between residents and non-residents. [2] Jan-Sept. [3] Jan-Oct. [4] Jan-Nov.

Sources: National balance-of-payments data and BIS estimates.

The monetary instruments and techniques central banks have at their disposal should reflect the compromise they desire to achieve between maximising financial market efficiency and stability, however the latter may be defined by a particular central bank. The instruments the central bank has available should thus reflect the potential size and nature of possible "shocks" it may have to confront. One might classify these shocks as: (a) "supply shocks" (e.g. the sudden change in an important commodity price); (b) a "capital flow/exchange rate shock" (the need to absorb or provide liquidity to the money market in large volume or to support a market challenge to an exchange rate commitment; (c) a "liquidity shock" to a particular financial market (a large unanticipated equity or bond price decline) or to a particular institution; (d) a "credit shock" (sudden reluctance to lend by financial intermediaries); (e) a "monetary shock" (a sharp contraction or expansion in the demand for money); and (f) an "instrument ineffectiveness shock" (e.g. the inability to have negative nominal interest rates).

An example of monetary policy used to combat a "credit shock" is the Federal Reserve during 1992-1993, here described by the Chairman of the Federal Reserve:

> "...Households and businesses became much more reluctant to borrow and spend, and lenders to extend credit--a phenomenon often referred to as the

> "credit crunch". In an endeavour to defuse these financial strains, we moved short-term interest rates lower in a long series of steps through the summer of 1992, and we held them at unusually low levels through the end of 1993--both absolutely and, importantly, relative to inflation...Lower interest rates fostered a dramatic improvement in the financial condition of borrowers and lenders...And banks, which had cut back on credit availability partly because of their own balance sheet problems, were able to strengthen their capital positions by issuing a substantial volume of equity shares and other capital instruments and by retaining much of their improved flow of earnings."[46]

As seen in Table 1, the Federal Reserve also twice reduced reserve requirements, in 1990 and 1992, with the intention of stimulating bank lending.

Central banks in recent years have also had to develop new techniques to defend exchange commitments when the private sector was unable to absorb a large and prolonged increase in short-term interest rates. Some other central banks have had to ask what monetary tools were available to support aggregate demand when the exchange rate appeared considerably overvalued, inflation was very low or negative and short-term interest rates close to zero. The response in Japan during 1996 was, arguably, to intervene in the foreign exchange market, expanding the central bank's balance sheet with foreign securities.

In recent years we have observed a number of central banks refine their methods of open market intervention in domestic securities and foreign exchange markets, to enable them to both improve the fine-tuning of interest rates, and to improve their ability to signal to the market central bank interest rate or exchange rate intentions. As seen earlier, central bank repo transactions have been particularly helpful in this regard. Yet, even given their signalling ability, in 1995 the Federal Reserve changed its policy of signalling to the market by announcing its short-term objective for the federal funds rate. The formal procedure is to:

> "Announce each change in the stance of monetary policy, including intermeeting changes, on the day they are made...Transcripts of FOMC meetings for an entire year will be announced with a five-year lag."[47]

This illustrates that a major characteristic of monetary operating tools and techniques is their information content and raises the issue of the optimal amount of "information disclosure" by the central bank. Disclosure can depend on how a particular operating procedure is employed: for example, in the switch from variable rate to fixed rate tenders by the Bundesbank. The appearance of financial markets at times to "overreact" to a change in policy has caused central banks to become increasingly concerned about the form of an interest rate adjustment and the manner in which it is communicated and received by market participants. Describing the need to end the prolonged period of monetary ease in the United States, referred to above, the Federal Reserve was concerned in early 1994 with the market reaction to a shift in policy stance. Again quoting Greenspan:

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[46] Greenspan (1994), p.606.

[47] Board of Governors of the Federal Reserve System (1995), p. 265.

> "The question that remained was how to implement this shift. The economy looked quite robust, but we were concerned about the effects on financial markets of a rapid move away from accommodation."[48]

To what extent has the increased integration of financial markets and the greater sensitivity to central bank market operations and information disclosure improved or hampered the ability of central banks to pursue their desired objectives? Even modest departures from earlier policies, or perceptions of a change in policy, can sometimes cause financial asset prices to move rapidly and dramatically. The need for greater central bank interest rate flexibility stems partly from the risk that market expectations may become extrapolative, given that some asset prices, particularly exchange rates, do not have obvious "equilibrium" levels. The improved integration of international financial markets, the greater resources available to institutional investors and the expanded ability of investors to leverage their capital requires that central banks both choose objectives which are transparent and sustainable and have flexible operating instruments to intervene in open markets.

Greater capital mobility and market integration have arguably undermined the ability of central banks to maintain exchange rate commitments. This point has been emphasised in the recent report by Group of Ten deputies.[49] It is useful to summarise the "lessons" reached by this report, in part a response to the 1992 European exchange rate crisis.

1. "...in today's international capital markets, official intervention on any plausible scale, when not supported by other policy actions, can be overwhelmed by market forces."

2. "...a pegged exchange rate arrangement is vulnerable to divergences over time in the economic performances of the countries participating in the arrangement. Even countries that succeed in maintaining sound economic fundamentals can find their currencies vulnerable to strong exchange market pressures triggered by currency depreciation in other participating countries."

3. "Experience indicates, however, that convergence of national inflation rates to very low levels is not always enough to ensure exchange rate stability. Under any type of exchange rate arrangement, various unexpected developments will give rise to periodic conflicts between the objective of exchange rate stability and domestic economic objectives, and countries must be prepared to sacrifice at least temporarily the latter objective to achieve the former."

4. "...so long as countries maintain meaningful independence of their national monetary policies, divergences in the domestic requirements for monetary policy that would normally imply exchange rate adjustments under a

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[48] Greenspan (1994), p.607.

[49] See Group of Ten (1993) and Bisignano (1994).

> floating exchange rate regime will tend to put pressure – sometimes very intense pressure – on pegged exchange rates. With the present high degree of international capital mobility, there is no practical escape from this dilemma..."[50]

Because of the difficulty of maintaining exchange rate commitments in recent years, some central banks have either/both altered exchange rate objectives and/or adapted monetary operating procedures when exchange rate uncertainty had increased. For example, the Czech Republic recently maintained a nominal fixed exchange rate commitment to a basket of the US dollar and D-mark within a plus/minus one-half percentage point band. Given the real appreciation of the Czech crown there had been some market expectations of an official revaluation. Attracted by higher interest rates than in the major western countries and modest exchange rate risk given the narrow band, large short-term capital inflows had increased money supply growth, making the problem of reducing inflation more difficult. In response the central bank altered its exchange rate policy by choosing a band of plus/minus seven and a half percent. This had the effect of reducing short-term capital inflows but without triggering any serious pressure on the exchange rate.

From mid-1992 to early 1993 the Banco de España found that exchange rate uncertainty was hampering the implementation of monetary policy, causing the central bank to search for new techniques to manage interest rates. The central bank had been using the thrice-monthly rate on the auction of certificates to provide a "monetary policy benchmark" and the daily intervention rate to handle temporary adjustments in the money and foreign exchange markets. Exchange market uncertainty was said to have "blurred" the signal of the short-term tightening of monetary policy provided by the overnight intervention rate, and the medium-term signal provided by the thrice-monthly rate. Earlier, these two rates had become closely linked but in the period of exchange market uncertainty they were designed to carry different messages. Movements in short-term rates were argued to have led to "excessive contagion...to the entire yield curve." To counter this difficulty the central bank changed its overnight intervention procedure in February 1993 by informing market-makers when it would intervene, but, unlike previously, not announcing at what rate, thus encouraging market operators to forecast more accurately their liquidity needs. At the end of the day the central bank then announced the average rate on its interventions. This had the desired effect of decoupling the two interest rates and adding greater stability to the interbank market.[51]

These examples serve to illustrate the greater flexibility central banks have had to adopt in choosing intermediate objectives, such as exchange rate commitments, and in adapting monetary operating procedures to varying money and exchange market conditions. Although reserve requirements and standing credit facilities have been reduced in importance in relation to open market intervention, one should not assume that this movement will dominate under all market environments.

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[50] See the note on the macroeconomic causes of recent exchange market turbulence prepared by the Research Department, IMF, in Group of Ten (1993), p. 150-151.

[51] See Sanz and Val (1993) for greater detail.

As we have tried to emphasise, the type of monetary instruments and operating procedures employed will depend on the source, nature and size of the particular "shock" hitting the economy.

VII. Conclusion

This paper has been a broad review of some of the issues confronting central banks in their choice of monetary operating instruments and techniques. Illustrations have been used to give some "policy life" to the generic issues involved in this choice. Essentially, five generic issues have been discussed. Firstly, central banks are having to find an achievable balance between enhancing efficiency in the financial system and their shorter and longer-term policy objectives. Secondly, the operating procedures and instruments chosen by the central bank need to reflect the shocks the economy is potentially subject to. Thirdly, increasingly integrated financial markets have required monetary techniques which impart greater flexibility to the central bank; hence the relative decline in the importance of standing credit facilities and the increased importance and sophistication of open market intervention techniques. Fourthly, policy signalling and disclosure have become increasingly important elements in short-term monetary management, with alternative techniques and instruments containing different degrees of information regarding central bank intentions. And lastly, monetary operating instruments and procedures, no matter how sophisticated or blunt, cannot compensate for an inappropriate choice of policy objective, particularly with regard to interest rates and exchange rates. It is rare that the inability to satisfy an intermediate-term policy objective was primarily due to the faultiness of the monetary operating procedures employed to achieve it.

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