1. INTRODUCTION

When I was a student thirty years ago, most economic textbooks portrayed reserve requirements as an important, if not essential, instrument of monetary policy. Many academic economists and policy makers argued that reserve requirements were needed to control money creation by commercial banks. Moreover, changes in reserve requirements were widely regarded as a useful monetary policy tool.

In recent years, the attitude toward minimum reserve requirements has changed significantly. Both academic economists and central bankers have become sceptical about the usefulness of reserve requirements. As a result, many countries have relaxed or abolished such requirements.

This shift in sentiment is not surprising. Historical experience suggests that the usefulness of reserve requirements depends on the institutional set-up of a country's financial system, especially on the country's approach to monetary policy, the intensity of competition and innovation in financial markets, the extent of the links between national and foreign financial markets, as well as the nature of the domestic payments system. Considering the drastic changes in monetary policy approaches and financial markets structures that have occurred over the past century, academic economists and central bankers cannot help reassessing their views on the usefulness of reserve requirements.

Reserve requirements are not a modern invention. Under the pre-1914 gold standard, various countries already saw fit to impose reserve requirements on commercial banks. The question of whether reserve requirements were needed arose – above all – in countries without central banks. In these countries the responsibility for issuing notes was vested in commercial banks, which were obliged to redeem on demand their notes in specie and, depending on the country, in other forms of lawful money. To guarantee the redemption of their notes, commercial banks were expected to maintain adequate reserves of specie. The introduction of reserve requirements reflected a concern that commercial banks might not hold voluntarily enough specie. In the United States, where
a central bank was not established until 1913, national banks were subject to reserve requirements against both their notes and deposits (FEINMAN, 1993, p. 572). In Switzerland banks were compelled to maintain a minimum specie reserve of 40 per cent against their notes, prior to the creation of the Swiss National Bank in 1907 (LANDMANN, 1910, pp. 35-36).\(^1\)

Even before World War I, however, the need for reserve requirements was not generally accepted. One might argue that market forces, by themselves, should have prompted commercial banks to provide for adequate holdings of liquidity. In principle, banks short of liquidity could always borrow the required specie from other institutions. But those attempting to manage their liquidity on a shoestring ran the risk of being penalized by high interest rates if they were forced to cover an unexpected loss of specie by borrowing from other institutions. Adequate holdings of specie protected them against high penalty rates.

Nevertheless, market forces did not prevent all liquidity problems. In countries without a central bank acting as a lender of last resort, the banking system as a whole occasionally ran short of liquidity. Such shortages were caused by unexpected increases in the public’s demand for money (prior to 1914 this frequently occurred during the harvesting season), forcing banks to accumulate additional liquidity, and by unexpected outflows of specie from the banking system into domestic nonbank use or to other countries. The ensuing scramble for liquidity repeatedly triggered banking crises. Interestingly, it is unclear to what extent reserve requirements enhanced the stability of the banking system. The United States was repeatedly shaken by banking crises, despite the existence of reserve requirements. Pre-1914 Canadian banks, by contrast, were not subject to reserve requirements. Yet, Canada where a central bank was set up only in 1935 did not suffer from banking crises (RICH, 1988, especially Chs. 5 and 6).

Since World War I, the role of reserve requirements has changed considerably. Virtually all the countries have created central banks that are prepared to support commercial banks in the event of liquidity crises. Today, regulations on commercial bank liquidity no longer seem to be as compelling as under the pre-1914 gold standard. Even so, reserve requirements have not vanished. On the contrary, they have appeared in countries where they did not previously exist. The widespread use of reserve requirements is explained by three reasons. First, they are often regarded as a useful instrument for controlling the money supply and, thus, for achieving the ultimate objectives of monetary policy. Second, many central banks still doubt that market forces, by themselves, induce commercial banks to manage their liquidity adequately. They are concerned that the execution of monetary policy might be hindered by excessively low commercial-bank holdings of liquidity. Third, reserve requirements are also imposed for

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1. Where central banks existed, they were normally subject to reserve requirements as well (BLOOMFIELD, 1959, pp. 17–18) to guarantee the redemption of their notes. The Swiss National Bank still has to maintain a minimum gold reserve requirement against its note issue. The requirement until very recently equalled 40 per cent and, thus, matched the ratio applicable to the former banks of issue. On November 1, 1997, it was reduced to 25 per cent.
fiscal reasons. Governments or central banks may try to increase revenue in the form of seigniorage from issuing money by forcing commercial banks to hold interest-free reserves.\(^2\)

In the following, I focus on the monetary policy aspects of reserve requirements. I ignore fiscal considerations since I do not regard reserve requirements as an efficient means of raising government revenue.\(^3\) Section 2 explores the usefulness of reserve requirements for strengthening control of the money supply and the central banks' ultimate target variables. In Section 3, I turn to the relationship between reserve requirements and the implementation of monetary policy. In Section 4, I ask how reserve requirements, if introduced at all, should be designed in order to assist effectively monetary policy. Section 5 offers concluding remarks.

2. **CONTROL OF THE MONEY SUPPLY AND OF THE ULTIMATE TARGET VARIABLES**

Reserve requirements were long regarded as an essential monetary policy instrument. They were thought to enhance the effectiveness of monetary policy in two ways. First, by establishing a tight link between the banks' reserves and their liabilities, they served to stabilize the money multiplier and to strengthen the central banks' influence over money creation by commercial banks. Thus, if central banks managed properly bank reserves, they could effectively control the growth in the money supply and in this way achieve their ultimate policy objectives such as price stability. Second, central banks, if necessary, could resort to changes in reserve requirements in order to influence the money supply. The ability to affect the money multiplier was regarded as a useful addition to the classical policy instruments, which could be used only to manage the supply of bank reserves.

For these reasons, it is not surprising that reserve requirements were widely employed as a control instrument. However, more recently, various defects of reserve requirements have emerged, casting increasing doubt on their usefulness as a monetary policy tool. In the subsequent discussion, it is convenient to distinguish between two problems: control of the money supply and of the central banks' ultimate target variables.

KEYNES (1971, pp. 59–69) was an early proponent of the view that reserve requirements strengthen the central banks' control over the money supply. He favoured a fractional and graduated system of reserve ratios of the form commonly used today. He also recommended that central banks be granted the power to vary reserve ratios within specified limits.

2. Minimum reserve requirements imposed for fiscal reasons may also take the form of regulations obliging banks to hold government securities. Under the pre-1914 gold standard, the introduction of reserve requirements was frequently motivated by fiscal considerations.
3. Furthermore, reserve requirements have been introduced for prudential reasons. I also disregard prudential considerations.
The supporters of the so-called «Chicago-Plan» for banking reform (see HART, 1935) went even further than Keynes. They proposed minimum reserve requirements of 100 per cent against demand deposits of commercial banks. Thus central banks – by managing commercial-bank reserves – would gain full control over the money supply. Commercial banks would be able to create money only to the extent that their monetary liabilities were fully backed by reserves held at the central bank. The Chicago-Plan, though supported by a number of prominent economists, was never a realistic proposal, not even when it was conceived in the 1930s. Reserve requirements of 100 per cent would have increased enormously the cost of financial intermediation and would have induced commercial banks to divert financial flows to channels unencumbered by such requirements. The proponents of the Chicago-Plan were clearly aware of these difficulties. HART (1935, pp. 451-454), for example, suggested that banks be subsidized «to meet the expense of offering chequing facilities.» This is akin to paying interest on reserves.

Modern financial markets offer numerous facilities for circumventing costly government regulations. Even reserve requirements not reaching 100 per cent may distort significantly financial flows. The monetary history of the post-World War II period abounds with examples illustrating this point. In the United States, reserve requirements until 1980 were imposed only on banks that were members of the Federal Reserve System. Beginning in the 1950s, many state-chartered banks, for whom membership was optional, left the System in order to take advantage of the normally less burdensome state provisions. Another problem was financial innovation resulting in new types of liabilities. The Federal Reserve was forced to adapt reserve requirements periodically to these new instruments. Further difficulties were caused by the growth in the Euro-currency markets, where in general deposits were free of reserve requirements. In the 1960s, U.S. banks increasingly resorted to the Euro-dollar market as a source of funds, partly to get around reserve requirements in the domestic market (FEINMAN, 1993, pp. 575-579). Similar problems were caused by German reserve requirements, which contributed strongly to the growth in Euro-markets for D-Marks, especially in Luxembourg (ISSING, 1993, pp. 108–109).

Consequently, reserve requirements need not strengthen the potency of monetary policy. On the contrary, by diverting deposit and credit flows to unregulated or lightly regulated markets, they may complicate the tasks of policy makers. Central banks employing a given monetary aggregate as an intermediate target variable may find that the introduction of reserve requirements indeed enhances their control of that aggregate. But tighter control may not mean much if the resulting distortions in deposit and credit flows undermine the role of that aggregate as a policy indicator.

As already suggested by HART, the distorting effects of reserve requirements would be mitigated if central banks paid interest on required or total reserves. Provided the remuneration on required or total reserves varied with market rates of interest, the incentive to shift to unregulated or lightly regulated markets would be greatly reduced. Even so, the distortions would not disappear entirely, especially if reserve requirements
were high. Large but interest-earning required reserves would still involve a compulsory loan to the central bank or the government and thus distort deposit and credit flows.

Distortions may not only be caused by high reserve requirements, but also by overly complex regulations entailing widely different ratios for various types of deposits and banks. Normally, demand deposits are subject to higher reserve ratios than time and savings deposits. In principle, it is sensible to graduate minimum reserve ratios according to the liquidity of bank liabilities. Even in the absence of reserve requirements, banks, for transactions purposes, would likely maintain higher reserves against their demand and other highly liquid deposits than against their remaining liabilities. Nevertheless, banks might be induced to change the composition of their liabilities if the graduation of minimum reserve ratios departed significantly from the structure that would prevail in an environment free of regulations. Furthermore, a graduated system of reserve ratios that might be optimal for controlling, say, the money stock M1 might not be optimal for controlling M3 or other broadly defined aggregates (see GEHRIG, 1977, on this last point).

Even if reserve requirements strengthen control of the money supply, they need not enhance the central banks' ability to achieve their ultimate policy objectives. As POOLE (1970) has shown, the choice of an optimal intermediate policy target such as the money supply depends on the type of shocks impinging on the economy. Central banks confronted with unexpected fluctuations in real demand for goods and services should target the money supply. A target aimed at steady growth in the money supply stabilizes automatically these fluctuations and dampens their impact on output and prices. An unexpected increase in real aggregate demand, for example, prompts a rise of interest rates unless the central bank reacts to that disturbance by expanding the money supply. The increase in interest rates counteracts the effect of the disturbance on output and prices. In the presence of monetary disturbances, such as unexpected fluctuations in money demand, by contrast, an interest-rate, rather than a money-supply, target is optimal. Under an interest-rate target, the central bank is induced to accommodate shifts in money demand by parallel changes in supply. In this way it suppresses the destabilizing influence of such disturbances on output and prices.

The POOLE analysis may be readily extended to banking systems subject to reserve requirements (see SIEGEL, 1981; BALTENSPERGER, 1982). Provided reserve requirements allow central banks to control more tightly the money supply, they are likely to enhance the stabilizing role of money-supply targets in the presence of real demand disturbances. But they are also likely to magnify the destabilizing role of such targets if the disturbances originate in the monetary sector of the economy. Reserve requirements do not impinge on price and output stability if the central bank pegs the interest rate. In this case, the central bank automatically offsets money-demand shocks (HORRIGAN, 1988).

Consequently, many of the arguments advanced in support of reserve requirements are unconvincing. They need not strengthen central-bank control of either the money supply or the ultimate target variables of monetary policy. Since the case for reserve requirements rests on weak economic foundations, they have lost much of the popularity
they enjoyed in the past. In recent years, many countries have lowered reserved ratios or have abolished reserve requirements altogether. Moreover, there has been a tendency to simplify unduly complex systems.

Not surprisingly, central banks that have abandoned money-supply targeting frequently do not consider reserve requirements to be essential for the conduct of monetary policy. In these circumstances, it is indeed hard to see how reserve requirements could help to tighten the link between the central banks’ instruments and the ultimate objectives of monetary policy. However, reserve requirements may not even be essential for central banks targeting the money supply. Of course, for such a policy approach to be successful, central banks must be able to control the money supply with a reasonable degree of precision. The controllability of the money supply does not require that the money multiplier be stable and predictable as the proponents of the Chicago-Plan believed. Past experience indicates that central banks have tended to manage the money supply by way of changes in interest rates, rather than by forecasting the money multiplier and setting the level of bank reserves consistent with the money-supply target. Central banks are able to achieve their money-supply targets so long as the demand for money is elastic with respect to interest rates and that elasticity remains reasonably stable over time.  

My sceptical remarks should not be misunderstood to imply that I favour abolishing reserve requirements altogether. Despite my misgivings, I maintain that reserve requirements help the conduct of monetary policy in two circumstances. First, in countries with poorly developed money and capital markets, central banks may not be able to employ classical monetary policy instruments such as open-market operations. They may have little choice but to resort to reserve requirements and other restrictions on commercial banks in order to control the growth in the money supply. This is indeed the case in the central banks of Eastern Europe and the successor countries of the former Soviet Union, which are transforming their economies to a market-based system. Second, even if money and capital markets are highly developed, reserve requirements may serve a useful purpose in that they assist central banks in the execution of monetary policy. I turn to this issue in the following section.

4. The demand for the narrowly-defined monetary aggregates (such as M1) is normally more sensitive to changes in money market rates than the demand for broadly-defined money. Therefore, central banks can typically control closely the narrowly-defined aggregates since they control money market rates. The control of broadly-defined money is more problematic. In Switzerland, the demand for M2 and M3 responds to changes in the federal government bond yield, which is not under the direct control of the SNB, rather than to money market rates (Peytrignet, 1996). See Thornton (1992) for a study on the issue of controlling US M2.
3. RESERVE REQUIREMENTS AND THE OPERATIONAL ASPECTS OF MONETARY POLICY

A number of central banks operating in highly developed money and capital markets continue to support reserve requirements. Examples are the Federal Reserve System, the Bank of Japan, the Bundesbank, the Swiss National Bank, and various other European central banks. Even in Canada, where reserve ratios were reduced to zero, reserve requirements were not abolished entirely (see Section 4). All these institutions justify the use of reserve requirements largely on operational grounds. In their view, reserve requirements help to moderate short-term fluctuations in interest rates and, thus, to defuse potential conflicts between the central banks' role as lender of last resort and their other obligations.\(^5\)

As indicated earlier, under the gold standard, countries without a lender of last resort frequently suffered from excessive volatility in interest rates. An extreme rise in interest rates, caused by a liquidity squeeze, could jeopardize the solvency of commercial banks and result in financial crises. In these circumstances, it was imperative for banks to hold ample reserves as a buffer against undesirable movements in interest rates. Reserve requirements were designed to strengthen the banks' ability for absorbing shocks.

The establishment of lenders of last resort reduced the need for commercial-bank buffer stocks. Nevertheless, central banks were reluctant to take over the exclusive responsibility for managing commercial-bank liquidity. In principle, commercial banks need not maintain significant levels of reserves provided central banks are prepared to smooth interest rates by offering generous lending facilities to financial institutions. For example, central banks could peg the overnight lending rate by satisfying any commercial-bank loan demand arising at this rate. In these circumstances, commercial banks could reduce their reserves to very low levels. In the event of a reserve deficiency, they could always acquire the needed reserves by borrowing from central banks at the fixed lending rate. Clearly, central banks would no longer act as lenders of last resort to commercial banks. They would turn into *lenders of first resort*.

Many central banks, including the Swiss National Bank, dislike the idea of being compelled to function as lenders of first resort. If central banks lent continuously to commercial banks, they could not help assuming risks that should normally be borne by the private sector. Risks arising from the payments system are a typical example. Much of the banks' demand for reserves stems from their role as suppliers of payments services. Payments between banks are settled through the interbank clearing system. Under many existing interbank clearing arrangements, payments between banks are netted at the end of the day. Any net claims remaining at the end of the day are settled by transfers of reserves from debtor to creditor banks. Thus payment flows give rise to so-called daylight overdrafts, that is, to intraday claims on other banks. Both commercial and central banks

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5. See Borto (1997, pp. 46–58) for a concise survey of current practices with regard to reserve requirements in the industrialized countries.
are greatly concerned about daylight overdrafts because they involve substantial credit risk. Reserves should be sufficiently high to enable banks, in normal circumstances, to settle daylight overdrafts without being forced to resort to central-bank credit. Otherwise, part of the credit risk arising from the payments system will be shifted to central banks. The need for adequate reserves is all the more important for real-time gross interbank settlement systems, under which each payment from one bank to another bank is accompanied by an instantaneous transfer of reserves. Gross settlement systems are less risky because daylight overdrafts are not permitted. But they do not function smoothly unless commercial banks maintain sufficiently large reserves throughout the day to cover their payments.  

One might object to the foregoing analysis by arguing that central banks, in practice, do not incur risks when they lend to commercial banks. Normally, central banks lend only on the basis of high-quality collateral. However, even if central banks only provided collateralized credit, they would still face awkward problems in the event of commercial-bank failures. Central banks heavily exposed to insolvent commercial banks would end up picking these institutions' best assets during liquidation. Central banks may avoid this kind of «cherry-picking» – which would hardly enhance their popularity – by refusing to act as lenders of first resort.

Central banks acting as lenders of first resort may also face another problem. The smaller the volatility of interest rates, the larger is the probability that the public will regard any rate adjustment as a shift in monetary policy. This may be undesirable if political resistance to rate adjustments, notably to increases in interest rates, is strong. In these circumstances, central banks keeping interest rates at arm's length may better succeed in achieving their ultimate policy objectives than those endeavouring to act as lenders of first resort. Operational procedures allowing both central banks and market forces to influence interest rates will help to improve the performance of monetary policy.

Thus ample commercial-bank holdings of reserves enable central banks to limit their role to that of a lender of truly last resort. However, if commercial banks are to keep ample reserves, will only reserve requirements force them to do so? Why would it not be in the self-interest of commercial banks to provide for adequate reserves?

In the absence of requirements, the central bank's mode of operating in the money market is obviously an important determinant of commercial banks' reserve behaviour. If the central bank makes it abundantly clear that it will not normally lend to commercial banks and that it will not endeavour to smooth interest rates, commercial banks will have no choice but to provide for adequate reserves. They will be induced to take on a shock-absorber role in the money market. But even if reserves are held on an entirely

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6. Switzerland was one of the first countries to set up a real-time gross settlement system (see below). Furthermore, the future European Central Bank will operate a real-time gross settlement system (called TARGET), linking the national payments systems through the respective national central banks. The national systems are also run or will be run on a real-time gross settlement basis. See EUROPEAN MONETARY INSTITUTE, 1997, Ch. III B.

7. See RICH and BEGUELIN (1985, pp. 105-107) for a theoretical analysis of this point.
voluntary basis, random disturbances affecting the money market may still result in excessively high interest-rate volatility, despite the shock-absorber role played by commercial banks.

The possibility that a voluntary system of reserve holdings may result in excessive interest-rate volatility leads to a further question. Why should central banks be concerned about interest-rate volatility so long as that volatility does not assume proportions jeopardizing the solvency of commercial banks? In my opinion, many central banks overstate the detrimental effects of interest-rate volatility. The bulk of the random disturbances affecting the money market, though triggering fluctuations in the overnight lending rate, do not spill over to longer-term rates. But it is the longer-term rates that impinge on private agents' spending decisions and, therefore, bear on the transmission of monetary policy to the real sector of the economy. Nevertheless, the volatility at the short end of the money market may reach levels high enough to affect longer-term rates. In these circumstances, it may be difficult for private agents to extract from noisy data the correct signals about monetary policy and other systematic factors influencing interest rates. Reserve requirements may contribute to strengthening the shock-absorber role of commercial banks and to reducing the noise-to-signal ratio in interest-rate movements.8

These considerations have led various central banks to insist on retaining reserve requirements. The Swiss National Bank is no exception. At the beginning of 1988, Switzerland modified its reserve requirements (which we call liquidity requirements). Swiss banks are subject to requirements on both cash and secondary reserves, with the latter comprising interest-bearing liquid assets. The purpose of that revision was to replace a cumbersome and badly enforced system by a simple one. The revision was preceded by a debate on the merits of reserve requirements. While the need to prescribe minimum holdings of aggregate liquidity was uncontested at that time (but appears to have become controversial recently), banks and some SNB officials questioned the wisdom of cash reserve requirements. Considering the SNB's approach to monetary policy, both proponents and opponents of reserve requirements insisted on Swiss banks holding ample cash reserves. It should be kept in mind that the SNB, in principle, does not act as a lender of first resort. Since 1989 it has kept the lombard rate (i.e., the rate on collateralized central-bank advances) consistently above the overnight lending rate in order to discourage borrowing by banks. Furthermore, it tolerates greater variability in the overnight lending rate than most other comparable central banks. In this way, both the SNB and market participants are able to trigger changes in that rate. Another reason why Swiss banks must hold ample cash reserves lies in Swiss Interbank Clearing, the electronic interbank payments system, whose introduction coincided with the revision of reserve requirements. SIC constitutes a real-time gross settlement system under which each payment elicits an instantaneous transfer of reserves to another bank.

8. See BINDSEIL (1997) for a theoretical analysis of how minimum reserve requirements may improve the information content of interest rates.
The proponents of reserve requirements were concerned that under a voluntary system banks might manage their reserves too aggressively and attempt to get away with minimal cash holdings. In the event of reserve deficiencies, they might try to obtain cash from other banks or, if the banking system as a whole was short of reserves, force the SNB against its will to make up for the shortfall. The SNB, the opponents retorted, need not yield to pressures by banks. It could, if necessary, allow the overnight lending rate to rise and in this way «discipline» recalcitrant banks. The prospect of disciplinary actions did not enamour the proponents of reserve requirements. The public, they maintained, would be at a loss to understand why the SNB preferred to impose its will on the banks through questionable disciplinary actions, rather than through reserve requirements. The outcome of the debate was to retain such requirements.9

Other central banks advance similar arguments to justify reserve requirements. The Federal Reserve cut reserve requirements in 1990 and 1992 in order to stimulate bank lending. Moreover, it realized that reserve requirements had become less essential because of its decision to abandon targeting bank reserves and the money stock M1 (Feinman, 1993, p. 581). Nevertheless, it continued to emphasize the importance of bank reserves as a buffer mitigating interest-rate volatility. For this reason, some Fed officials were concerned that the reduction in reserve requirements would complicate monetary policy. It might force the Fed to offer to the banks overdraft facilities at the end of the day, which would «go against the thrust of efforts to reduce daylight overdrafts» (Meulendyke, 1993, p. 3). Fed officials have also argued that the U.S. central bank would be unable to return to a policy of targeting bank reserves, in lieu of the Federal Funds rate, if reserve requirements were abolished (Feinman, 1993, p. 584).

Similarly, in Germany reserve requirements in recent years have been relaxed and simplified. The Bundesbank no longer regards reserve requirements as an essential instrument for controlling the money supply. Nevertheless, it does not favour abolishing reserve requirements. It argues that reserve requirements remain useful for stabilizing the demand for central bank money and for containing interest-rate volatility. Without reserve requirements, the Bundesbank would be compelled to «fine-tune» the money market. Moreover, it might be at the mercy of banks requiring central-bank credit in order to meet reserve deficiencies (Issing, 1993, pp. 107–108; 1994, pp. 56–57).

9. One might argue that central banks could smooth interest rates without relying on minimum reserve requirements and without lending generously to commercial banks. They could manage bank liquidity exclusively through open-market operations. In practice, in countries without reserve requirements, lending facilities tend to play an important role in monetary policy operations. Particular difficulties arise from the introduction of real-time gross settlement systems, which tend to enhance substantially liquidity pressures on banks. Sellon and Weiner (1997) study monetary operations in three countries (UK, Canada and New Zealand) without reserve requirements. In all the three countries, the central banks decided to offer generous lending facilities to commercial banks. Through open-market operations alone, they could not react quickly enough to liquidity pressures emanating from the payments system. For example, after the establishment of a real-time gross settlement system in 1996, the Bank of England allowed the banks to obtain on demand intraday credit in the form of collateralized repurchase agreements. The cases of the UK and Canada are discussed further below.
The Bank of England, by contrast, does not see a need for reserve requirements. In its view, central banks should provide buffer-stock liquidity through collateralized overdraft facilities and, thus, avoid the distortions arising from reserve requirements (KING, 1994, pp. 69–70). UK authorities still compel banks to hold «cash ratio deposits». But this requirement is very low and serves the sole purpose of providing income to the Bank of England (KING, 1994, p. 64).

The foregoing analysis indicates that the major central banks within the European Union do not agree on the need for reserve requirements in the conduct of monetary policy. Not surprisingly, this division of opinion also surfaces in the debate concerning the monetary policy instruments to be employed by the future European Central Bank. The ECB will begin its operations on January 1, 1999, if the third stage of the European Monetary Union is realized according to the schedule of the Maastricht Treaty. The ECB may – but is not obliged to – impose minimum reserve requirements on financial institutions in the countries participating in the third stage. If the ECB were to introduce such requirements, the minimum reserves would have to be held in accounts at the national central banks of the countries in which the financial institutions are located. Moreover, the system the ECB would be authorized to implement would be largely consistent with the criteria set out in the following section (EUROPEAN MONETARY INSTITUTE, 1997, Ch. II 3.3 and Appendix 7).

4. PRACTICAL PROBLEMS OF IMPLEMENTING RESERVE REQUIREMENTS

The preceding analysis yields a number of criteria that must be satisfied if reserve requirements are to play a useful role in monetary policy. The criteria concern the mode of calculating required reserves, as well as the average size and the graduation of reserve ratios.

4.1 Mode of Calculating Required Reserves

If required reserves are to serve as a shock absorber, they should be available to commercial banks to meet unexpected cash drains. This implies that an averaging procedure should be employed in order to calculate required reserves. Banks should not be obliged to meet reserve requirements daily, but on the average over a specified maintenance period. The length of the maintenance period should match the periodicity of typical payments in an economy. In Switzerland a one-month maintenance period was chosen because salaries, housing rents and other important items are normally paid monthly. Therefore, Swiss banks must make sure that average reserve holdings for a particular maintenance period do not fall short of the required level.\(^\text{10}\) Since banks know

\(^{10}\) In Switzerland the maintenance period extends from the 20th of one month to the 19th of the following
that the bulk of unexpected cash drains will be reversed within the maintenance period, they are able to use required reserves for payments purposes. Had banks to meet requirements daily, they could not use required reserves for that purpose.

Another problem relates to the range of assets that banks may use to satisfy reserve requirements. If commercial banks are to be compelled to hold sufficiently large deposits with the central bank, required reserves should only cover such deposits. However, in Switzerland, limiting required reserves to deposits with the SNB would cause serious problems for the smaller banks, holding a relatively large proportion of their reserves in the form of vault cash. For this reason, Swiss banks may count vault cash towards their required reserves.11

A further issue concerns the question of whether required reserves should be computed on the basis of contemporaneous or lagged systems. In Switzerland, a lagged system is used, that is, required reserves for a given maintenance period are based on average deposit levels recorded at the end of the three months preceding that period.12 The advantage of lagged systems is that banks know exactly their required levels of reserves before the start of the maintenance period. The Federal Reserve, by contrast, has used a contemporaneous system for most of the time. Contemporaneous systems are said to strengthen central-bank control of the money supply, but it is unclear whether in practice the choice of system makes much difference (FEINMAN, 1993, p. 577).13

### 4.2 Average Size of Reserve Ratios

To avoid serious distortions in deposit and credit flows, average reserve ratios should be relatively low. However, if relatively low reserve ratios are set, the question arises whether the buffer stocks the commercial banks are required to hold are sufficiently large to dampen the volatility of interest rates. I already showed that Federal Reserve officials express concern about a possible conflict between the needs to strengthen the competitive position of commercial banks and to provide for adequate buffer stocks.

Swiss experience with reserve requirements lends some support to these concerns. When Swiss reserve requirements were modified in 1988, the SNB (BIRCHLER, 1988, month. A one-month averaging period is also used in Germany, France, Japan, Canada and other countries (Borio, 1997, Table 8). The ECB will use a one-month averaging period too if it should opt for reserve requirements (EUROPEAN MONETARY INSTITUTE, 1997, Appendix 7).

11. Deposits of banks with the post office may also be used to satisfy reserve requirements. In addition to the banks, the post office operates a payments system through which the bulk of small payments are settled. In the United States, similar considerations led to the inclusion of vault cash in required reserves in 1959 (Feinman, 1993, pp. 575–577). However, in most other industrial countries vault cash cannot be counted towards required reserves (Borio, 1997, Table 8).

12. In Switzerland the lag is relatively long. It only amounts to half a month in Germany, France and Japan (Borio, 1997, Table 8).

13. Another issue concerns carry-over provisions, that is, the possibility of using excess reserves held in a particular maintenance period to satisfy the requirement for the subsequent period.
DO CENTRAL BANKS NEED MINIMUM RESERVES?

pp. 75–76) indicated that the aim of the revision was to prevent irresponsible behaviour by the banks with respect to reserve management. Therefore, the required level of reserves should not exceed the volume which well-managed banks would elect to hold voluntarily. There was little doubt that a well-managed bank could not help keeping ample liquidity, considering the SNB’s operational approach and the nature of the Swiss interbank payments system. Nevertheless, the SNB did not want to err on the side of too much regulation. It was concerned that overly severe requirements would undermine the competitive position of banks and induce them to shift business to unregulated areas. Swiss authorities have traditionally favoured a liberal approach to bank regulation and supervision. Moreover, they have seldom restricted international capital flows. For these reasons, Swiss financial markets are closely integrated with those in the rest of the world. Considering their capacity for financial innovation, Swiss banks could easily circumvent overly severe requirements. The resulting distortions in bank balance sheets would likely impair the indicator role of Swiss monetary aggregates. To avoid such problems, relatively low reserve ratios were imposed on Swiss banks (2.5 per cent on Swiss-franc denominated demand and time deposits with a term to maturity up to three months, 0.5 per cent on Swiss-franc denominated savings deposits, and 0 per cent on all the other liabilities).

Due to the low levels of reserve ratios, there is no evidence to suggest that banks have been prompted to divert business to unregulated areas. The banking system as a whole maintains excess reserves (amounting to roughly 25 per cent of required reserves), suggesting that for many banks reserve requirements are not binding (see also Section 4.3). While reserve requirements do not weaken the competitive position of Swiss banks, they may be too low to provide for fully adequate buffer stocks. Although the SNB is prepared to accept considerable volatility in the overnight lending rate, it must from time to time take steps to counteract strong – and frequently inexplicable – movements in demand for bank reserves. But I do not wish to dramatize these «fine-tuning» operations. They are second-order problems of monetary policy and do not prevent the SNB from achieving its ultimate objectives. The trade-off between the needs to strengthen the competitive position of banks and to provide for adequate buffer stocks is not serious enough to warrant an increase in reserve ratios.

Central banks concerned about that trade-off may consider two alternatives. First, as mentioned earlier, they could set reserve ratios high enough to provide for adequate buffer stocks. To mitigate the distortions arising from these high ratios, they could pay a market-related rate of interest on required reserves. This alternative is not feasible in Switzerland as the SNB is not permitted to pay interest on reserves. The second possibility involves the Canadian system of zero reserve requirements. Under this system, banks are still required to hold a minimum average level of reserves during a one-month maintenance period, but that average is set equal to zero. Banks are allowed

14. The ECB will be permitted to pay interest on minimum reserves (EUROPEAN MONETARY INSTITUTE, 1997, Ch. II 3.3).
to borrow from the Bank of Canada at the Bank Rate against eligible collateral, that is, they may overdraw their accounts. However, any negative balances held during part of the maintenance period must be compensated by positive reserves held during another part or by an advance at the Bank Rate at the end of the maintenance period. Banks with surplus balances receive interest on their reserves at 50 basis points below the bank rate. The spread of 50 basis points defines a corridor for the overnight lending rate in the money market, with the ceiling equal to the Bank Rate and the floor equal to the rate on surplus reserves (CLINTON, 1997). The Canadian system is designed to free the banks of reserve requirements without foregoing the benefits of averaging. Despite its obvious attractions, the Canadian system is unlikely to be appealing to central banks, such as the SNB, reluctant to act as lenders of first resort.

4.3 Graduation of Reserve Ratios

Since the various types of deposits differ in terms of their liquidity, reserve ratios should be graduated. However, care should be taken to avoid creating new distortions through inappropriate and overly complex systems of graduation. Other distortions may arise if a uniform set of reserve requirements is imposed on banks differing widely in terms of their activities. This is a problem in Switzerland. While the largest banks may be regarded as universal institutions, most of the smaller banks are highly specialized, operating in such diverse areas as mortgage lending, investment banking, securities trading and portfolio management. Uniform reserve requirements may not take sufficient account of the specifics of the individual banks’ business. In Switzerland, for example, excess reserves are held mostly by smaller banks, while reserve requirements tend to be binding for the large institutions. But tailoring reserve ratios to different types of banks would be undesirable too because it would likely result in new distortions. These difficulties once again may be diffused if low reserve ratios are fixed.

REFERENCES


15. The ECB will also define a ceiling and floor for the overnight lending rate. The ceiling will be determined by the Lombard rate, the floor by the rate on a deposit facility the ECB will offer to financial institutions (EUROPEAN MONETARY INSTITUTE, 1997, Ch. II 3.2).

16. Japan operates a system with substantial graduation, but the reserve ratios are low by comparison with other countries (BANK OF JAPAN, 1995, pp. 65–66; BORIO, 1997, Table A.II.1).

17. The big banks and the largest cantonal banks typically report no or very small excess reserves.


**SUMMARY**

In this paper I tried to show that the economic arguments in support of reserve requirements are not strong. Reserve requirements were long regarded as an essential instrument for the control of the money supply and the ultimate target variables of monetary policy. However, a substantial body of research suggests that the importance of reserve requirements for monetary control has been overstated. Central banks operating in highly developed and globalized financial markets are well advised to employ market-related techniques of monetary policy, rather than to rely on quantitative restrictions such as reserve requirements. If reserve ratios are high, such requirements may even turn out to be counterproductive in that they distort deposit and credit flows. This is likely to undermine the indicator role of monetary aggregates and to complicate the tasks of central banks.

Nevertheless, modest reserve requirements may assist central banks in the operational aspects of monetary policy. Ample reserves allow commercial banks to play a shock-absorber role in the money market. Commercial-bank buffer stocks reduce the need for central banks to moderate interest-rate volatility by «fine-tuning» their money-market operations and/or by acting as lenders of first resort to commercial banks.
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CONCLUSION

Dans cet article, je tente de montrer que les arguments en faveur des prescriptions de liquidités ne sont pas absolument convaincants. Les prescriptions de liquidité furent longtemps considérées comme un instrument essentiel de contrôle de l’offre de monnaie et comme l’objectif ultime de la politique monétaire. La recherche récente tend cependant à démontrer que l’importance des prescriptions de liquidité a été surestimé. Les banques centrales opérant au sein de marchés financiers hautement développés et globalisés devraient mettre l’accent davantage sur l’emploi d’instruments monétaires qui s’adaptent aisément aux lois du marché plutôt que sur des techniques de limitations quantitatives. Si les ratios de trésorerie sont élevés, de telles prescriptions de liquidité peuvent même s’avérer contre-productives dans la mesure où elles perturbent l’allocation des dépôts bancaires et des crédits, minant ainsi la qualité d’indicateur des agrégats monétaires et compliquant la tâche des banques centrales.

Néanmoins, des prescriptions de liquidité raisonnables sont susceptibles de faciliter la conduite opérationnelle de la politique monétaire. Des réserves suffisantes permettent en effet aux banques commerciales d’absorber en partie les chocs qui frappent le marché monétaire, réduisant ainsi la nécessité pour les banques centrales de contenir la volatilité des taux d’intérêts en ajustant continûment leur politique opérationnelle et/ou en agissant comme les prêteurs de premier recours auprès des banques commerciales.