What is the Role of the Monetary Base in Monetary Policy Today?

By Mika Pösö and Livio Stracca, Frankfurt/M.*

I. Introduction

The *monetary base* consists of liabilities of the monetary authority that are used by the non-bank public as media of exchange (currency in circulation), and by banks to settle interbank payments and to fulfil reserve requirements (excess and required reserves).[1] Payment in these central bank liabilities constitutes final settlement of transactions.

It is widely agreed that a central bank's ability to influence interest rates and the economy in general stems from its role as a monopoly supplier of the monetary base and especially the reserves held by banks with the central bank. It is this privilege which in the end distinguishes central banks from other economic agents. Since the monetary base consists of liabilities of the central bank's own balance sheet, it is usually seen that the central bank should have a full control over their amounts.

The role of the monetary base in monetary policy has been under continuous debate during the last few decades.[2] Over these years, the monetary base has been seen both as a useful and useless concept in formulating and implementing monetary policy. Despite different views on its usefulness, the monetary base is usually found to be, at least, an interesting concept. Being at the core of central banking and representing the means by which transactions are ultimately finalised, this is hardly surprising.

---

[1] On different measures of the monetary base see e.g. *Garfinkel* and *Thornton* (1991b).

[2] The terms "base money", "high powered money", "central bank money" and "outside money" are sometimes used as synonyms for the monetary base.

Traditionally, those who have shared a monetarist view of the economy have seen benefits in using the monetary base as a policy target and instrument. When listing those who have tended to give prominence to the monetary base as a useful long run anchor for the price level, Meulendyke (1990) mentions the proponents of the quantity theory of money, the long-run neutrality of money and rational expectations.

Despite the fact that theoretical considerations have perhaps tended to support the monetarist view, practical issues related to the concept of the monetary base and to the implementation of monetary policy have usually argued against targeting and/or controlling the monetary base. Interestingly enough, as Goodhart (1994) points out, those working in central banks have usually been most active in bringing these practical obstacles forward.

Probably due to the fact that today nearly all central banks in the world use interest rates as the main monetary policy instrument, the quantitative side of monetary policy implementation has not received much attention lately. As emphasised for instance by Henckel, Ize and Kovanen (1999), the decline in importance of reserve requirements and the introduction of symmetric interest rate corridors is consistent with this development.

At the same time, despite all recent scepticism over the significance and the usefulness of the monetary base for central banks, the quantitative side of monetary policy implementation seems to be coming to the fore once again, for essentially two reasons.

First, due to the fact that in Japan nominal short-term interest rates have hit the zero bound in recent years and the necessity of providing stimulus to the Japanese economy, some academics (for example Meltzer (1998 and 1999a)) have recommended using the monetary base (or subcomponents of it) as the operating target of monetary policy in Japan. Indeed, in March 2001, the Bank of Japan decided to switch from interest rate targeting to quantitative reserves targeting in implementing its monetary policy, increasing the target substantially and repeatedly thereafter. The debate over monetary policy under zero short-term nominal rates stimulated by the Japanese experience has renewed the interest in role of the monetary base as an *instrument* for the central bank in the transmission of monetary policy impulses to aggregate demand.

Second, recent theoretical developments have also tended to attribute some importance to the monetary base as an information variable rele-

vant for monetary policy making. Notably, in a neo-Wicksellian framework (Woodford (2003)) the effect of monetary policy on the economy depends on the spread between the prevailing interest rate (determined by the central bank) and a "natural" interest rate (determined exclusively by real factors). As Nelson (2002) suggests, swings in the demand for the monetary base might be an important indicator of whether the actual interest rate is departing from or approaching the natural rate. More in general, it has been argued that the monetary base (and other monetary aggregates) can convey in a parsimonious manner information about the state of the economy (and in particular about agents' mood and expectations) which is not directly observable by the central bank.

Against this backdrop, the main purpose of this paper is to provide a bird's eye look at the role of the monetary base in monetary policy today and to draw some general conclusions.[3] It should be clarified first that this review is not comprehensive and it will touch upon issues related to the monetary base in a selective manner, being focused mainly on the *macroeconomic* role of the monetary base and its importance for central banks in conducting monetary policy. Consequently, we are mainly interested in the *low frequency* development of the monetary base and its components, say at a monthly or quarterly frequency. So, in our review we do not deal extensively with the kind of issues which arise when controlling liquidity and interest rates within a reserve maintenance period or on a day-to-day basis.

The paper is structured as follows. First, in Section II. we review some recent contributions in literature which have brought the monetary base once more to the fore after some time. Subsequently, in Section III. we review the use of the monetary base (or sub-components of it) as a policy instrument or target, which is mainly (although not exclusively) related to monetary targeting in vogue in the 1970s and 1980s. Section IV. contains the conclusions.

---

[3] Our work is closest in spirit to the review by *Meulendyke* (1990), and essentially aims at representing an up-date of that study.

II. Some Recent Contributions to the Macroeconomic Role
of the Monetary Base

In industrialised countries the monetary base is made of essentially three components. First, it includes *currency in circulation* (CC), i.e. cash held by non-banks. Second, it includes *required reserves* (RR), i.e. cash held by financial intermediaries at the central bank because they are required to by law or regulation. Third, it includes *excess reserves* (ER), i.e. current account balances freely held by financial intermediaries at the central bank.

It is important to emphasise at the outset that the three main components of the monetary base are reflecting very different determinants. Especially when the reserve requirement is of a lagged type, the only relevant component from a monetary policy implementation perspective is ER, while RR and CC are practically exogenous for the central bank. In fact, while RR is in principle not totally exogenous since the central bank can change the characteristics of the minimum reserve system, changing the reserve requirement is normally considered to be a too rough and inflexible way to reach short-term operational goals. Moreover, central banks de facto will have to provide sufficient reserves to commercial banks if they require them to hold such reserves by law; so, as a matter of fact, central banks have no choice but to provide required reserves to the banking system. As to currency in circulation, this component of the money base is *de facto* always provided by the central bank on demand, so it may again be treated as an exogenous variable for the central bank. In fact, in developed economies the central bank does not entertain any *direct* relationship with the general public, but only with financial intermediaries and the government. Financial intermediaries (commercial banks in particular), on their part, have the obligation vis-à-vis their clients to convert deposits into cash on demand. Consequently, central banks *indirectly* also have to provide cash to non-banks on demand, and every change in the demand for cash by non-banks is ultimately bound to show up in intermediaries' *reserves* position vis-à-vis the central bank, rather than in currency in circulation.[4]

---

[4] Of course, this does not imply that central banks cannot influence CC and RR *indirectly* via setting short-term interest rates.

1. Can the Monetary Base Enter Into the Aggregate Demand Curve?

a) As an Information Variable

One major reason why the monetary base, and in particular currency in circulation, has received some attention in the recent literature is the possibility that this variable is a good indicator of pressures on aggregate demand and might therefore be a good measure of the stance of monetary policy. This role may reflect the consideration that monetary policy affects a number of financial prices (e. g., via expectations) and not only the interest rate on short-term interbank deposits (Meltzer (1999b)). So, the expected return on a number of financial instruments might be reasonably included in the aggregate demand equation, and the typical formulation including only a single short-term interest rate (controlled by the central bank) is probably at least to some extent mis-specified (Christiano, Rostagno and Motto (2003)). Moreover, as Nelson (2002, 2003) argues, due to the presence of portfolio adjustment costs, many financial prices may also affect the demand for money. So, both the aggregate demand and money demand equations may be affected by the same (unobservable) fundamental determinants. Against this background, the demand for real balances (including the monetary base) may represent a particularly parsimonious way to enrich the explanatory power of the aggregate demand equation from an *empirical* standpoint, because the effect of a number of financial prices is *implicitly* and *parsimoniously* embodied in the behaviour of the monetary aggregate. Formally, one might express the "true" aggregate demand equation as:

$$(1) \qquad\qquad y = f(r_S, r, \sigma, \ldots),$$

where y is a measure of excess demand (e. g., the output gap), r_S is the real short-term interest rate, r a vector of expected real returns on financial and real assets (including physical and human capital), and σ the perceived riskiness of these returns. Of course, these expected returns are not observable for the central bank. However, *empirically* one may approximate (1) with equation (2):

$$(2) \qquad\qquad y = g(r_S, m/p, \ldots),$$

where m/p is the real money stock (the real monetary base), based on the consideration that m/p is in some way linked to r and σ.

Interestingly, while Rudebusch and Svensson (2002) reported that broad money has no explanatory power for the output gap in an aggre-

gate demand equation for the United States (money being proxied with the broad monetary aggregate M2),[5] Nelson (2002), working on U.S. and U.K. data, argued that if the monetary base (and not the broad monetary aggregate M2) is included in the same equation, it becomes positive and significant. So, monetary base developments appear to be at least correlated with (and thus have leading indicator properties for) subsequent changes in output. One conclusion to be drawn from the empirical results of Nelson (2002) is that the monetary base may be a better "summary statistic" of the monetary policy stance than the short-term real interest rate from an empirical perspective.

Nelson mentions two possible reasons why the monetary base might have a key indicator role with respect to the monetary policy stance. Both are closely related to the 'neo-Wicksellian' approach (Woodford (2003)) whereby the central bank affects aggregate demand by creating a gap between the real interest rate and the (unobservable) natural interest rate, i.e. the level of the real rate which would prevail if prices were completely flexible. The main argument is that monetary base developments – which are observable – might be correlated with developments in the real rate gap – which are unobservable – and therefore have some additional information value for the central bank. The theoretical aggregate demand curve can be expressed in this case as:

$$(3) \qquad\qquad y = f(r_S - r*, \ldots),$$

where $r*$ is the natural rate of interest. Empirically, this could again be relatively well approximated by equation (2), reflecting essentially two arguments.

First, as noted above, in the presence of portfolio adjustment costs, cash demand becomes inherently forward-looking and long-term interest rates could therefore enter in its determination.[6] Moreover, if money demand is forward-looking, today's cash balances will depend on *expected future* income, in addition to current income. Therefore, a shock to the natural interest rate – unobservable for the central bank in real time – affects expected *future* output, but also currency demand *today*. For example, an (unobservable in real time) increase in the natural rate of interest (and output growth) due to a positive shock to productivity

---

[5] *Woodford* (2001) also finds that direct effects of monetary aggregates on aggregate demand should be negligible.

[6] Assuming that portfolio adjustment costs are minor for banks, bank reserves (ER and RR) should be almost unrelated to long-term rates.

growth raises agents' perceived wealth and their expected *future* income, which fuels *today's* cash demand. Hence, from the behaviour of cash demand the central bank can infer the underlying movement in the natural rate of interest which would otherwise go unnoticed. All in all, currency demand developments might in turn convey important information for the central bank.

A second explanation of why the monetary base might enter the aggregate demand equation mentioned by Nelson can be set in terms of the possible effect of movements in the natural rate on the central bank own balance sheet. In fact, if the central bank wants to enforce a deviation of the short-term nominal interest rate from its natural level, it might have to take a net (borrowing or lending) position vis-à-vis the market, which should ultimately have a bearing on its balance sheet. If, for instance, the actual interest rate is lower than the natural rate, the representative market participant should want to borrow more central bank money, which might result in a boost to the size of the central bank balance sheet. However, a rigorous general equilibrium analysis of the relationship between the demand for monetary base and the interest rate gap has yet to be developed, as Nelson (2002) admits.[7] It is likely that further developments in this strand of literature will yield important results for the possible role of the monetary base as a key information variable in monetary policy-making.

b) As a Policy Instrument

Not surprisingly, whether the monetary base enters significantly in the aggregate demand curve has also been the object of considerable interest in the context of the debate on how to conduct monetary policy when the short-term interest rate hits the zero bound.[8] The Japanese case demonstrates that this is not a mere academic preoccupation. Indeed, in March 2001 the Bank of Japan decided to switch to a new operating strategy

---

[7] *Woodford* (2001), for instance, claims that the central bank's enforcement of a certain level of the nominal interest rate does not need to have a counterpart in the central bank balance sheet, i.e. the central bank does not need to take a net or long position vis-à-vis the market in order to set the nominal interest rate at the level which it desires (and which might deviate from the natural rate). If this were true, the monetary base would hardly be an indicator of the interest rate gap, as instead *Nelson* (2002) argues. This is clearly a very interesting issue for further research.

[8] See especially the November 2000 issue of the Journal of Money, Credit and Banking.

based on a quantitative target for bank reserves (Bank of Japan (2001a, 2001b, 2001c and 2002)). Clearly, it is the intention of the Bank of Japan to try and stimulate the economy using a channel different from the short-term interest rate, using bank reserves and hence the monetary base as an independent monetary policy *instrument*.

It is important to note that a 'neo-Wicksellian' inclusion of the monetary base in the IS curve as an *indicator* of the interest rate gap (as discussed above) does *not* imply that the central bank can use the monetary base as an independent instrument to stimulate the economy out of a liquidity trap. In other words, it does *not* provide a separate transmission mechanism for monetary policy when the short-term interest rate hits the zero bound (although monetary base developments can still contain useful information of the severity of the deviation of the actual rate from the natural rate). Thus, the foundations of a transmission mechanism exclusively based on quantities cannot be found in a natural rate model. Here, what we want is the monetary base to enter the aggregate demand curve *on its own*, not as a convenient and parsimonious empirical summary indicator of long-term interest rates or the interest rate gap. Formally, we have a different model compared with (1)–(3):

(4)
$$y = f(r_S, r, \sigma, \ldots)$$

(5)
$$(r, \sigma) = h(m/p, \ldots) \Rightarrow y = f(r_S, h(m/p, \ldots), \ldots)$$

The idea here is that the amount of monetary base in circulation affects the expected returns r and their riskiness σ in some way, captured by the h function.

Views on whether such a separate transmission mechanism exists are quite divided in the literature (Clouse et al., 2003). The "conventional" view would be that at a zero short-term interest rate money injections would be like "pushing on a string", as banks (or non-banks public) would merely substitute reserves for other short-term assets. However, Meltzer (1998), McCallum (2000) and Goodfriend (2000), among others, have argued in favour of the existence of a monetary base transmission channel and thus of a "quantitative" monetary policy tool in the Japanese case. According to these authors, injections of monetary base for a given (zero) short-term interest rate can stimulate aggregate demand due to the imperfect substitutability among financial (and real) assets. Monetary base injections would raise the broadly defined liquidity services (decrease the external finance premium) and thereby boost agents' pro-

pensity to spend via a portfolio re-balancing effect.[9] To achieve this result, it is crucial that the monetary base injections take the form of open market operations in which the central bank purchases *long-term* bonds, for purchases of short-term bonds would be completely irrelevant at zero short-term interest rates.[10] An even more drastic measure advocated by Goodfriend (2000) is the central bank lending directly to private agents, affecting aggregate demand via a standard "credit channel" (Bernanke and Gertler (1995)).

Overall, a direct effect of the monetary base on aggregate demand would be related to imperfections and frictions in financial markets preventing a perfect substitutability among different financial instruments and real assets. Hence, this mechanism is valid only to the extent that such imperfections are empirically relevant from a macro perspective, which is still an open question. In addition, it is likely that monetary base injections necessary to stimulate the economy would have to be of a very large size, which might raise concerns over the government's backing of possible central bank losses (Bryant (2000)).[11] In sum, there is still a great deal of uncertainty over the direct effect of monetary base injections on aggregate demand.

It is worth noting that these considerations would also have important repercussions on the optimal selection of the monetary policy instrument. It is well know that, within the standard "Poole" approach (Poole (1970)), the optimal selection of the monetary policy instrument (interest rate or monetary aggregate) depend on the relative variances and the covariance of the disturbance terms in the aggregate demand (IS) and

---

[9] For a theoretical analysis of asset liquidity and the role of open market operations in affecting liquidity constraints see *Kiyotaki* and *Moore* (2002). For a review of the role of the monetary base in the transmission of monetary policy, with a particular application to the Japanese situation, see *Hetzel* (2003).

[10] In this respect, it is interesting to note that Bank of Japan increased outright purchases of long-term government bonds together with the increase in the qualitative target in August 2001 (see *Bank of Japan* (2001b)).

[11] A fully similar reasoning would be valid for central bank purchases of assets denominated in foreign currency in order to depreciate the exchange rate and stimulate the economy via exports (see *McCallum* (2000)). Apart from signalling effects, these open market operations would only work if assets denominated in foreign currency are imperfectly substitutable with assets denominated in domestic currency (*Freedman* (2000)). That different effects may be reached via a monetary base expansion carried out through purchases of short-term securities, long-term bonds and foreign currency assets suggests that not only the *size*, but also the *modalities* of a money base injection matter as far as the impact on aggregate demand is concerned.

money demand (LM) equations. Normally, this type of analysis leads to the conclusion that the (short-term) interest rate is the optimal monetary policy instrument.

However, it is interesting to note that the possibility the monetary base (or sub-components of it such as currency in circulation) enter significantly in the IS equation might change this traditional conclusion to a considerable extent. It is not inconceivable that if monetary base changes have a stronger (and/or more predictable effect) on aggregate demand than changes in short-term interest rates the merits of a quantity-based operational framework might be reconsidered, also in countries where the zero bound on interest rates is *not* a relevant constraint for policy.[12]

2. Will the Monetary Base Disappear? Will it Matter
for the Implementation of Monetary Policy?

A second prominent reason for the monetary base to attract interest in recent literature is whether advances in transactions technology and in payment systems (such as e-money) might drive it out of existence over time. According to some authors, this might deprive the central bank of any means to affect the interest rate and hence the economy. According to Friedman (1999, 2000), King (1999), and Costa and De Grauwe (2001), the demand for the monetary base as a means of settlement payments is bound to decline drastically over time due to technical progress.[13] Moreover, institutional changes (sometimes driven by the necessity to avoid regulatory arbitrage) tend to drive down reserve requirements and hence the demand for bank reserves (see, for instance, Bennett and Peristiani (2002)). Indeed, in some countries (such as Canada[14]) there are no reserve requirements (although banks still hold strictly positive settlement balances).[15] In the euro area required reserves are significant and there is

---

[12] Interestingly, based on this type of considerations *Christiano, Rostagno* and *Motto* (2003) find that the Great Depression would have been milder had a (counter-factual) monetary base rule been implemented by the Fed.

[13] For instance, the widespread introduction of net payment systems arrangements tends to reduce money base demand; see *Henckel, Ize* and *Kovanen* (1999). Conversely, the use of gross settlement systems such as the TARGET mechanism in the EU tends to raise the demand for central bank money.

[14] See *Clinton* (1997) on monetary policy implementation without required reserves in Canada, and *Sellon* and *Weiner* (1996) for a review of the analytical issues.

no apparent tendency for intermediaries to circumvent the obligation, but this is largely explained by the fact that required reserves are remunerated at market rates.

Other authors, however, do not concur with this gloomy prospect for the future of central banks (liabilities). Goodhart (2000) and Drehmann and Goodhart (2000), in particular, emphasise that cash has some intrinsic features (most notably its anonymity) which makes it hardly replaceable by e-money even in the long run. Moreover, Goodhart (2000) argues that even in the unlikely case that the demand for central bank money is driven to zero, the central bank will always remain in command of short-term interest rates due to a non-zero elasticity of the short-term interest rate to net "monetary" injections.[16] A similar view is also supported by Henckel, Ize and Kovanen (1999), who argued that the complete extinction of the monetary base could not undermine monetary control since central banks can target interest rates and inflation even in the absence of the monetary base. In this view, central banks would remain the only entity that is allowed to corner the market for settlement balances by forcing participants to lend and borrow from its end-of-day facilities at the rates it chooses. Woodford (2001) also noted that a decline in the demand for cash by non-banks might determine a decline in the volatility of cash demand (because a shock to cash is ultimately a shock to reserves, for a given supply of liquidity by the central bank). This would actually make the control of the interest rate by the central bank *easier*, rather than more difficult. Overall, the view seems slightly prevalent in the literature that a strong decline in the monetary base should not fundamentally deprive central banks of the ability to influence short-term interest rates and thereby the economy in the foreseeable future (see also White (2001)). The only situation in which monetary policy could become almost completely ineffective is where the central bank liabilities cease to be even a unit of account, but this possibility is very remote (Woodford (2001)). In any case, there are no clear signs thus

---

[15] In the United Kingdom, banks and building societies are required to hold the so-called "Cash Ratio Deposits", which account for 0.15 % of their eligible liabilities. However, the system is not alterable for monetary policy purposes.

[16] The term "monetary" here should be understood in broad terms. A "monetary" injection might be consist of a position taken by the central bank on an hypothetical e-money market, under the assumption that the central bank could always issue e-money itself, by force of the backing of the government. *Costa* and *de Grauwe* (2001), however, argue that this would make the central bank dependent on the government again, with the (bad) consequences that we have seen before central bank independence was established.

far of a substantial decline in cash demand around the world, and e-money remains of marginal importance as means of payment for the time being.

III. The Experience with the Monetary Base
as a Target or Indicator

In the recent history of central banking the monetary base, or its components, have been used both as an intermediate target and as an operational target of monetary policy. In the former case, monetary base targets have normally been set over a longer-term horizon (such as one year), and the actual day-to-day policy has been carried out using an interest rate as instrument. In the latter case, the monetary base has been used as a short-term instrument of monetary policy. In addition to these roles, the monetary base can play the role of an information variable in the context of a monetary policy conducted with the short-term rate as the instrument.

More specifically, the monetary base can be used as an *intermediate target* through which the central bank aims *indirectly* at its long run goals of price stability and sustainable economic growth. Meulendyke (1990) reviews a number of papers from 1970s and 1980s, which use U.S. data to examine the impact of the choice of monetary variables on the rate of change in nominal income and prices. We will deal with this set of issues in Section III.1.

Second, the monetary base can be used as an *operational target,* namely as the variable which the central bank controls closely in the short-term implementation of monetary policy. With the exception of the Swiss National Bank, which used the monetary base both as an operational and intermediate target (1980–1999), the monetary base (or reserves) has been used as an operational target mainly outside the context of monetary targeting. The Reserve Bank of New Zealand (until 1999) and the Bank of Japan (from 2001) represent recent examples of this. We will analyse this type of monetary base targeting and the problems of controllability that it may imply in Section III.2.

Third, the monetary base can be used as an *information variable,* namely as a useful indicator in the overall assessment of a monetary policy stance defined in terms of a short-term interest rate. This is the favoured use of the monetary base and its components by most central

banks in industrialised countries today. We will elaborate on this role in Section III.3.

Finally, in Section III.4 we report some concrete examples of policy experience with using the monetary base as an intermediate or operating target of monetary policy.

1. The Monetary Base as an Intermediate Target

Mainly as a result of Friedman and Schwartz (1963) and related work, monetarist views about the impacts of fluctuations in money growth started to receive considerable attention among academics in the late 1960s and early 1970s. As the inflation rates continued to increase over the 1970s, the growing weight of empirical evidence supporting the monetarist views finally pushed central banks to incorporate money growth into their policy deliberations and assessments.[17] Influenced by a high correlation between money growth and inflation and following the prescriptions by monetarist economists, a growth target for the money supply was adopted, for instance, in Switzerland in 1974 and in Germany in 1975. In the U.S. and in the U.K., money growth targets were publicly adopted in 1975 and 1976 respectively.

However, controlling the targeted monetary aggregates proved difficult rather quickly for a number of reasons. The initial attempts to control the money supply and inflation only by means of adjusting interest rates encountered serious problems. The frustrations led academics and central bank economists to consider the possible adoption of monetary base control as an alternative and possibly superior technique to control the money supply.

It is important to note that the monetary base approach to monetary policy was introduced in connection with monetary targeting with the aim to meet the targets for broader monetary aggregates more efficiently. Controlling or targeting the monetary base under other monetary policy strategies may not be meaningful or even possible. For instance, it would be meaningless to aim at controlling the monetary base in a small open economy with a fixed exchange rate system, under which the inter-changeability of foreign exchange (i.e. foreign reservers of the central bank)

---

[17] See *Hafer* and *Wheelock* (2001) on the active role of the Federal Reserve Bank of St. Louis in the development and advocacy of stabilisation policy based on targeting monetary aggregates in the U.S.

and domestic currency (banks' reserves held with the central bank) makes the monetary base to a large extent uncontrollable. The operational principle of the currency board system underlines this point. Therefore, as some central banks pointed out in the BIS (1980) review of monetary base targeting, the quantitative control over the monetary base must to a considerable extent be considered as an alternative to the stabilisation of exchange rates.

At first, monetary base control appeared simple and straightforward. When asked to explain the difference between monetary base control and the conventional approach of controlling interest rates, Milton Friedman's response to the House of Commons Select Committee in 1980 was the following: *"Trying to control money supply through 'fiscal policy and interest rates' is trying to control the output of one item (money) through altering the demand for it by manipulating the incomes of its users (the role of fiscal policy) or the prices of substitutes for it (the role of interest rates). A precise analogy is like trying to control the output of motor cars by altering the incomes of potential purchases and manipulating rail and air fares. In principle, possible in both cases, but in practice highly inefficient. Far easier to control the output of motor cars by controlling the availability of basic raw materials, say steel, to manufacturers – a precise analogy to controlling the availability of base money to banks and others"*.[18]

Advocating control of broader monetary aggregates via controlling the monetary base usually implies appeal to the money multiplier model of money supply. In a textbook money multiplier model, the supply of money is determined in a straightforward way (Mishkin (1995)):

$$(6) \qquad M = \frac{1 + \left(\frac{CC}{D}\right)}{rr + \left(\frac{R}{D}\right) + \left(\frac{CC}{D}\right)} \times MB,$$

where M is the (broad) monetary aggregate serving as an intermediate target, MB is the monetary base and the money multiplier is determined by CC (currency in circulation), rr (required reserve ratio), R (excess and required reserves) and D (deposits).

According to the money multiplier model (6), the central bank determines the supply of the targeted monetary aggregate by setting the

---

[18] See *House of Commons Treasury* and *Civil Service Committee* (1980).

monetary base at a level, which through a mechanistic money multiplier process delivers the desired money supply. Since the money multiplier is known and assumed predictable, and the control over the monetary base is assumed to be perfect, the central bank is able to determine the supply of money with a high precision. The level or the growth rate of the monetary base is simply adjusted to a conditional target that is consistent with the broad monetary target and the forecast of the money multiplier. During the given period, the monetary base is chosen as the operational target serving as a guideline for central bank operations on a short term basis.

Based on the assumption that the monetary base is directly observable and controllable by the central bank with only a one-day lag, the control of the monetary base does not involve any information problems. Hence, the multiplier approach reduces the information problem to one of forecasting the multiplier. In fact, the quality of the multiplier forecast is the most important property for the performance of monetary base control in the context of monetary targeting.[19]

The criticism against the traditional textbook money multiplier model and its role in monetary targeting has mostly concentrated on its simplistic and mechanistic nature, and in particular its lack of micro-foundations. Furthermore, it is often claimed ·that the money multiplier is not stable over time and controlling the monetary base does not deliver the expected changes in the money supply.[20]

A number of factors have been mentioned as disturbing the stability and predictability of the money multiplier. The factor normally contributing the most to the volatility of the money multiplier is the ratio between currency in circulation and deposits. In the early work this ratio was assumed structurally stable and possible deviations were assumed to be only temporary (Brunner and Meltzer (1983)). However, structural shifts in the demand for currency, e.g. due to the innovations in the payment technology, have proved this assumption too restrictive.[21]

---

[19] See, e.g., *Rasche* and *Johannes* (1987) on forecasting the money multiplier in the U.S.

[20] For a more elaborated money supply model, see e.g. *Bofinger* and *Schächter* (1995) who, based on a traditional non-linear money supply model by *McCallum* (1987), builds a complete model of the money supply process, taking into account the interdepence of commercial banks', non-banks' and the central banks' decisions.

Usually the money multiplier is thought to express how much the broader money supply changes in response to a given change in the monetary base. However, this characterisation is problematic especially when a lagged minimum reserve system is applied. In a lagged minimum reserve system the monetary base is partly determined by the deposits (or the reserve base) prevailing in the previous period. Therefore, in order to forecast the money multiplier with the necessary accuracy, also the deposit growth (or the growth of the reserve base) needs to be forecast accurately. There is a vast amount of literature about lagged and contemporaneous minimum reserve systems and their effects on monetary base control. Usually, it is concluded that a lagged minimum reserve system deteriorates the central bank's ability to control the monetary base and the broader monetary aggregates (Thornton, (1982) and Brunner and Meltzer (1983)). On the other hand, contemporaneous minimum reserve system is operationally very challenging to implement, if anything due to the problem of obtaining reliable data in real time.

However, the role of reserve requirements is seen as important in enhancing the controllability of broader monetary aggregates via the money multiplier. On the demand side, required reserves, when unremunerated or remunerated clearly below the market rates, enhance the interest rate elasticity of the demand for broad money. On the supply side, by making the average of the money multiplier more predictable over the maintenance period, required reserves contribute to the stability of the link between the monetary base and the targeted broader monetary aggregate. In order to perform these functions efficiently, a considerable degree of overlap is required between the liabilities subject to reserve requirement and the definition of the targeted monetary aggregate.

The money multiplier model is sometimes characterised by saying that it decomposes the movements in the money supply into the part that is due directly to central bank actions (the monetary base) and the part which is independent of the policy actions of the central bank (the money multiplier). However, Garfinkel and Thornton (1991a) question this view claiming that the Federal Reserve's monetary policy actions are reflected both in the adjusted monetary base and the money multiplier.[22]

---

[21] According to *Garfinkel* and *Thornton* (1991a), changes in the currency-deposit ratio alone explained 80% of the month-to-month variability of the money multiplier in the US.

[22] *Garfinkel* and *Thornton* (1991a) argue that as a result of Monetary Control Act of 1980 and the resulted lower required reserves, the positive relationship between reserves supplied by the Federal Reserve and deposits strengthened. As a

Consequently, central banks must also predict the effects of their policy actions *on the money multiplier* if they follow the multiplier approach.

2. The Monetary Base as Operating Target: Controllability Problems

The most prominent advocate of using the monetary base as the operating target of monetary policy was McCallum (1988). In his view, the monetary base can be controlled easily and accurately by the central bank and this makes it a desirable operating target for monetary policy. Based on the empirical evidence available at the time, monetary base growth had also a strong empirical link with nominal GDP growth which, according to McCallum (1988) and other authors, can be considered as an appropriate final target for monetary policy.

Against this backdrop, McCallum proposed the following *monetary base rule*:

$$(7) \qquad \frac{\partial m}{\partial t} = k - v + \lambda (Y* - Y)_{t-1},$$

where m is the monetary base, t is time, k is the target growth rate of nominal GDP, v is a measure of velocity growth trend, Y is nominal GDP and $Y*$ its trend level. The feedback coefficient λ should be positive (McCallum proposed $\lambda = 0.25$) for the rule to have stabilising properties. This implies that monetary base has to be expanded when nominal GDP is below trend, and reduced in the opposite case.

Apart from the fact that a policy rule like (7) crucially depends on a reliable empirical link between the monetary base and GDP (see the considerations made earlier in Section 2), it should be emphasised that using the monetary base as an operating target raises significant problems of *controllability*.

In fact, pursuing a monetary policy strategy based on the monetary base as an operational target implies that the central bank has a *total control* over the monetary base. This assumption is normally maintained based on the consideration that the monetary base consists of the liabilities of the central bank balance sheet, and it is argued that the central bank should be in the position to perfectly control its own balance sheet.

---

result, monetary policy actions that affect reserves affect deposits and, consequently, the currency to deposit ratio in the money multiplier.

However, Goodhart (1994) notes that almost all those who have worked in a central bank believe that this view is mistaken, since the supply of currency is demand-determined and its effects on the monetary base are, as a rule, always to be accommodated one-to-one.

Indeed, what makes the controlling of the monetary base problematic in practice is the fact that the monetary base consists of very different components that are imperfect substitutes. Currency in circulation, normally by far the largest component of the monetary base, is, as a rule, issued to credit institutions on demand, and the same holds true for required reserves. The fact that the largest part of the monetary base is determined endogenously makes the short-term controlling of this aggregate very challenging in practice.

Hafer, Haslag and Hein (1996) consider explicitly the role of currency in circulation in implementing a monetary base rule. They claim that earlier studies have ignored the distinction between reserves and currency in circulation and simply treated the two as perfect substitutes. They consider whether following a monetary base rule of the type proposed by McCallum (1988) would pose an implementation problem for the Federal Reserve if it continued to supply currency on demand. They find that by following a McCallum type of rule and supplying currency on demand, the reserves component of the monetary base would decline dramatically, actually turning negative, when the growth of the monetary base is set to achieve a non-inflationary 3% rate of nominal GNP growth. Hafer, Haslag and Hein conclude that their results seriously question assertions that a McCallum type monetary base rule is operational in practice.[23]

Jefferson (2000) looks at another implementation problem of a monetary base rule related to currency in circulation. He points out that more than 50 percent of measured currency in circulation outside US banks was held abroad in 1995. Jefferson constructs the so-called "home" monetary base by combining the *domestic* currency stock with (total) reserves and examines whether removing the foreign component of the monetary base matters for the performance of the McCallum monetary base rule. Jefferson finds that McCallum's monetary base rule performs better when the "home" monetary base is employed. He also finds that a

---

[23] Similarly, *Friedman* (1988) wonders whether the advocates of monetary base control really want the Federal Reserve to reduce the stock of reserves this way, and thereby force the banking system to squeeze deposits in response to a surge in currency.

simple reduced-form macroeconomic model that uses the "home" monetary base has more explanatory power for changes in nominal income than when the total monetary base is used.

The fact that currency in circulation is not controlled by central banks, at least in the short-term, seems to be the main obstacle for monetary base targeting. The Bank of Japan (2001a) highlighted this obstacle when it announced changing the main operational target from the overnight rate to the *total reserves of the banking system* in March 2001. The Bank of Japan explicitly stated that the monetary base was *not* chosen as a target since it is difficult for the Bank of Japan to effectively control the amount of currency in circulation. As the reason, the Bank of Japan reported that currency in circulation is determined by the demand from households and firms and is normally relatively interest-insensitive.

In addition to the "currency problem", Goodhart (1994) identifies another key obstacle for monetary base control, noting that commercial banks are not willing to hold non-interest bearing excess reserves at the end of each day. This fact implies that any attempt to achieve some particular level, or rate of change, in the monetary base is bound to cause a reserve surplus or deficit leading to excessive interest rate volatility. Modern monetary policy operational frameworks are designed to facilitate an efficient targeting of short-term interest rates, not reserves. This implies that the banking system is allowed to determine the level of reserves according to its liquidity needs at given policy rates. Supplying liquidity in excess or under the amount actually needed by the banking system would cause excessive movements in the marginal cost of liquidity, and consequently excess volatility in short-term interest rates, possibly blurring the signalling of the monetary policy stance.

McCallum (1997) replies to Goodhart's (1994) criticism on monetary base control arguing that although Goodhart's discussion is apparently intended to be concerned with the *feasibility* of monetary base control, Goodhart's actual argumentation pertains to its *desirability*. McCallum stresses that *factually* central banks are able to control the monetary base if they *want to*. McCallum also states that most proponents of monetary base control do not deny that such a regime would involve more variability of short-term interest rates than is experienced under today's typical procedures, which involve interest rate instruments and short-term interest rate smoothing. Proponents of monetary base control and targeting would contend that with the monetary base as an instrument it is possible to design simple policy rules that are more effective

from a *macroeconomic* perspective than are comparable rules with interest rate instruments.

An important aspect in attempting to control the monetary base, and the interest rate volatility consequences of it, is the appropriate time period over which it is desirable to achieve the target. Supporters of the monetary base approach initially argued in favour of short-run targets. However, according to Meulendyke (1990), many of the operational and stability concerns associated with monetary base targeting would be reduced if the time period for achieving the target is lengthened to one to two quarters. It is likely that the longer the horizon, the less instability in interest rates and money demand will result.[24]

In addition to the practical problems of monetary base control related to currency in circulation and inelastic excess reserves, also other fundamental obstacles are mentioned in the literature. Those favouring a short-run control of the monetary base for broad money targeting have generally argued that credit institutions are able to make quick adjustments to deposits if they were given the incentive to do so. Excess reserves would disappear rather quickly since they are lent or invested. This, in turn, would raise deposits through multiple deposit creation and ultimately increase the reserve base and required reserves. In the opposite case, the shortage of reserves would lead to the scaling down of loans and deposits until required reserves decrease by desired amount. However, the incentives for these kind adjustments are affected strongly by the characteristics of the monetary policy operational framework. Thornton (1982) mentions lagged reserve requirements and a small spread between the discount rate and the market interest rate as factors interfering with the bank's ability to adjust required reserves quickly.

It is important also to bear in mind that changing the monetary policy operational frameworks in a direction more suitable for quantitative targeting and removing impediments such as lagged reserve requirements would not necessarily solve the problems of controlling the monetary base. It is argued that credit institutions cannot easily make the large adjustments to loans, investments or deposits that are needed to achieve the (required) reserve levels consistent with the targeted monetary base. Meulendyke (1990) mentions two reasons for this. First, each individual institution would have difficulty gauging whether an excess or shortage

---

[24] Also *Brunner* and *Meltzer* (1983) and *Thornton* (1982) shared this view. See also the policy experiences in Germany, Italy and Spain as reported in the *BIS* (1980) volume.

of reserves relative to its requirements resulted from a policy adjustment, from a poor distribution of reserves in the banking system or from the central bank's error in forecasting shocks to reserves. Individual credit institutions would have trouble discovering the true reserve picture only from observing their reserve levels, because liquidity flows can be very large relative to average reserve balances. Second, even if a credit institution correctly perceives a policy based reserve shortage or excess, its most likely response would be to adjust its loan and deposit rates and fees only *gradually*. Sharp swings in interest rates would have to occur to achieve the necessary rapid changes in deposits. This, in turn, might induce instability in the demand for money and the targeted monetary aggregate would not respond as expected to a reserve excess or shortage. As a result, both the targeted monetary aggregate and interest rates would be subject to undesirable and unpredictable short-run volatility.

3. The Monetary Base as an Information Variable

A further, and maybe more modern role for the monetary base is as an *information variable*. As Meulendyke (1990) points out, economists were implicitly making analytical use of the monetary base concept already early in the twentieth century. For instance, Irving Fisher described the role of currency as a circulating medium and as a major source of reserves to banks. The other form of reserves was interbank deposits. Fisher described the changes in currency and reserves as the primary source of growth or decline in the quantity of money because, in normal times, the ratio of currency to deposits (i.e., CC/D in (6)) would be determined by payment practices and customs that did not change significantly over time.

A large number of papers have tried to test the "additional" or "marginal" information in various definitions of money (including the monetary base) on future inflation and output growth. Normally these analyses are carried out in a-theoretical models, such as small-scale unrestricted VAR, where changes in inflation and output are regressed on past values of themselves and on money growth. Two relatively recent examples for this approach, and quite favourable on the information value of the monetary base, are Lapp (1997) for the U.S. and Breedon and Fisher (1996) for the U.K. More recently, however, Anderson and Rasche (2001), estimating a stable demand function for the U.S. monetary base for the period 1919–1999, find that the monetary base can provide guidance for monetary policy makers only when inflation or the level of nominal in-

terest rates is high. At low levels of the nominal interest rate, due to the higher interest sensitivity, monetary base developments become more volatile and are therefore less informative for the central bank.

Recalling the considerations in Section 2, there are at least three reasons why the monetary base might contain useful information for central banks. First, currency in circulation is closely related to transactions and the data might be more promptly available and more accurate than those of economic activity, making it a valuable coincident indicator of the business cycle. Second, possible inclusion of the monetary base in the IS curve (be it as a proxy for long-term rates or for the interest rate gap, or for both) attributes an important indicator role to this variable. Third, the monetary base is related to broad money via required reserves.

A more important role might conceivably be attributed to the monetary base when it enters in the formulation of a policy rule, even when the short-term interest rate remains the policy instrument of the central bank. Somewhat departing from the earlier papers, McCallum has pointed out in later papers (see Haldane, McCallum and Salmon (1996)) that the McCallum money base rule can also be made operational with an interest rate instrument, as a matter of fact attributing an *information role* to the monetary base.

When the monetary base is used as an information variable, it is crucial to analyse the main components of the monetary base, currency in circulation and bank reserves, in a separate manner. It may well be that the two components display divergent developments and point to opposite directions. An example of this is Friedman's (1988) criticisms towards McCallum's empirical results, which related the movements of nominal income to the movements of the monetary base. Friedman shows that the favourable simulation performance reported by McCallum hinges crucially on the role of currency in the monetary base. More in general, it is likely that the demand for currency in circulation, being closely linked to transactions, is a better coincident and perhaps also leading indicator for activity and inflation than bank reserves. On the other hand, however, currency in circulation is not directly controllable by the central bank and does not play an active role in the implementation of monetary policy.

In this respect, the developments in the euro area monetary base during 2000–2003 provide a useful example. As can be seen from Figure 1, the only reason for the sharp fall of the yearly growth rate of the monetary base in 2001 was the currency component of the monetary
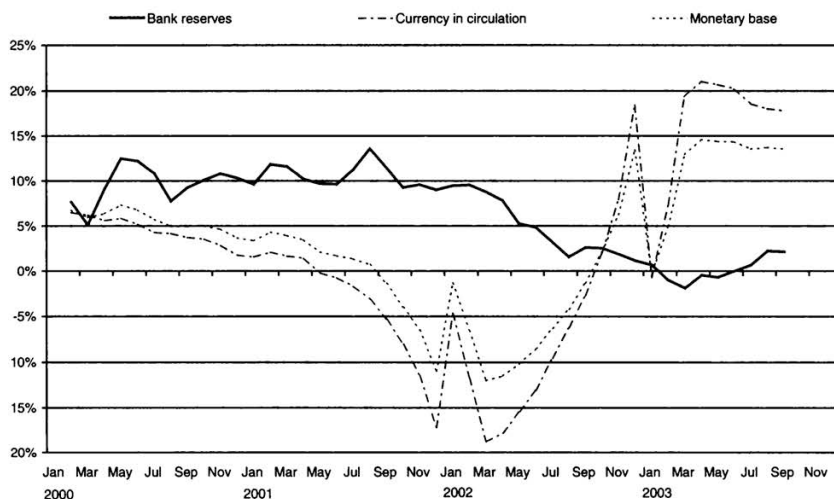
*Figure 1: Annual Rate of Growth of the Monetary Base in the Euro Area
(Calculated from daily average level in the maintenance period
ending in the month shown)*

base. The developments in currency in circulation in 2001 and 2002 were heavily affected by the approaching cash changeover. Looking merely at the growth rate of the monetary base would lead one to neglect the fact that the growth rate of bank (required) reserves, and hence the reserve base, has remained more stable, starting to decrease only in the second quarter of 2002.

4. Some Selected Policy Experiences

As argued earlier, the predictability of the money multiplier is a necessary condition for monetary base control in the context of targeting a broader monetary aggregate. However, changing the operational target of the central bank may have significant effects on the money multiplier and its predictability. The disturbing consequences to the money multiplier were not seen only relevant when an interest rate target was changed to a quantitative operational target, but also when a suitable quantitative operational target was selected. Actually, as shown by Axilrod (1983), the expected problems with the stability of the money multiplier were used as a reason for preferring reserves to the monetary base as an operational target in the U.S. in the late 1970s.

Generally speaking, the aforementioned problems with monetary base control have been reflected in central banks' choices of quantitative operational targets and the ways these targets are aimed at. For instance, in 1979 the Federal Reserve introduced an operating procedure aimed at controlling the growth of bank reserves in order to target M1. The procedure was implemented by establishing an operational target for so-called "non-borrowed" reserves, which represent the component of total reserves (and of the monetary base) that is under the total control of the Federal Reserve and not directly affected, for example, by the level of short-term market interest rates (unlike borrowed reserves the level of which can be affected by banks accessing the discount facility). This choice meant that a large part of the monetary base, mainly currency in circulation, but also borrowed reserves, remained endogenous. Under the non-borrowed-reserves targeting, the money supply schedule was conditional on both non-borrowed reserves and the spread between the federal funds rate and the discount rate. Consequently, as Thornton (1982) shows, the supply of money exhibited greater interest rate sensitivity under non-borrowed-reserves targeting than under pure monetary base targeting, dampening potentially excessive interest rate volatility.[25]

Even though the non-borrowed-reserves procedure allowed for some modest smoothing of the federal funds rate, this rate varied considerably more, on a day-to-day and week-to-week basis, than it had before the procedure was introduced. Moreover, as Borio (1997) shows, the volatility of the overnight rate was transferred also to longer maturities, e.g. to the three-month money market rate. The other notable feature of the period was that M1 growth slowed on average and came closer to its desired targets over extended periods of time, but experienced variability from month to month and quarter to quarter more than before. Meulendyke (1990) summarises the period of non-borrowed-reserves targeting in the U.S. by saying that it appears that the procedure followed was able to bring M1 back on target when it veered off and to prevent an off-target trend. Nonetheless, it did introduce a substantial amount of short-run variability to both M1 and interest rates.

---

[25] The targets for non-borrowed reserves were derived by estimating the volume of total reserves believed to be consistent with desired M1. Under this procedure, currency and reserve ratios expected to be associated with the desired M1 were estimated. Finally, the non-borrowed reserves operating objective was derived from the total reserve target by subtracting an amount of borrowing believed to be consistent with interest rate levels that in turn would be consistent with the desired money growth.

According to Thornton (1988), the Federal Open Market Committee abandoned M1 targeting and the non-borrowed-reserves targeting operating procedure when the relationship between M1 and nominal GNP broke down in the early 1980s. Officially, the Fed only switched from the non-borrowed-reserve targeting to the borrowed-reserves targeting procedure in 1982. However, the borrowed-reserves targeting represented *de facto* a policy reversal towards the setting of the federal funds rate and away from direct money stock control since targeting borrowed reserves implied controlling the federal funds rate in practice. As Thornton (1988) puts it, the borrowed-reserves targeting procedure actually produced results that are identical to those of a federal funds rate targeting procedure if all shocks emanate from the demand for money or reserves.[26]

The Deutsche Bundesbank and the Swiss National Bank (SNB), which pursued a kind of monetary base targeting for some time, aimed at meeting the targets in a flexible and pragmatic manner. The Deutsche Bundesbank made it clear that targeting the monetary base (called the central bank money stock at the time) was simply a proxy for targeting broad money M3, to which the monetary base was supposed to be strictly linked (Deutsche Bundesbank (1985)). The reason for choosing the monetary base instead of M3 was mainly the more prompt availability of the data and the better controllability (Reischle (2001)). In 1988, the monetary base was abandoned as an intermediate target in favour of broad money M3, on the grounds that especially the demand for currency was too volatile.

According to Rich (1997 and 2000) the Swiss National Bank adjusted the supply of the monetary base to unexpected shifts in demand provided these shifts were permanent or if transitory, at least persistent. The SNB tended to wait until it was reasonably certain that it faced a demand disturbance requiring an adjustment in the supply of the monetary base. Bank reserves could fluctuate substantially from day to day because the SNB attempted to smooth fluctuations in short-term interest rates. When the SNB wanted to increase the monetary base, it supplied

---

[26] There is also empirical evidence that the Fed was actually targeting the federal funds rate from autumn 1982 onwards. *Thornton* (1988) shows that during the period between 1983 and 1986, the funds rate varied less around its mean than borrowed reserves fluctuated around the borrowing target, suggesting that the Fed was targeting the funds rate rather than borrowed reserves. Consistent with this evidence, *Greenspan* (1997) has acknowledged that "increasingly since 1982 we have been setting the funds rate directly in response to a wide variety of factors and forecasts".

additional reserves to the banks and as a result, short-term interest rates fell. In practice, reserves did not need to be raised much in order to induce a drop in interest rates. However, with a lag of several months, the decline in interest rates led to a rise in the demand for currency and thus in the monetary base.

Although the SNB's experience with monetary base targeting was positive, some difficulties existed. Rich (2000) attributes the difficulties mainly to the existence of policy lags. Rich claims that it may take up to three years until a change in the growth of the monetary base significantly affects Swiss inflation. That is why the monetary base was not well suited for deciding how the SNB should respond to unexpected shocks, notably exchange rate and cyclical shocks. Finally, when the monetary base began to display erratic behaviour in 1996, the SNB started to reconsider its approach to monetary policy implementation upon the completion of the targeting period 1995–1999. At the end of 1999, the SNB decided to abolish monetary-base targeting in favour of an approach based on an inflation forecast. At the same time the SNB changed its operational target, expressing it as a band for the three month Libor rate.

The excessive volatility of interest rates was the key reason why the Reserve Bank of New Zealand decided in 1999 to abandon its previous operational framework centred on controlling the quantity of settlement cash (which left the determination of short-term interest rates to a large extent to market forces). Over time, the Reserve Bank of New Zealand became increasingly aware that "the relationship between the quantity of settlement cash supplied, bank behaviour and interest rates was not very tight or predictable. For any given quantity of settlement cash, bank lending, interest rates, the exchange rate and other important variables in the transmission mechanism could vary widely" (Reserve Bank of New Zealand (2000)). For a while, the Reserve Bank of New Zealand tried to steer short-term interest rates via signalling statements (the "open mouth" approach described in Guthrie and Wright (2000)), but in the end it decided to abandon the old system based on quantitative targeting. Under the new system ("cash rate"), the central bank aims at steering the overnight rate in a narrow interest rate corridor set by the Lombard and the deposit facility rates.[27] As a result, the volatility of the overnight and other short-term market rates declined considerably.

---

[27] Yet, the Reserve Bank of New Zealand has made clear that the level of settlement balances would still be looked at as an information variable.

In evaluating the policy experience of the Reserve Bank of New Zealand with its form of monetary base targeting, it should not be overlooked that the central bank was able to carry out a costly dis-inflation process especially in the first part of the 1990s. Probably, the fact that during this difficult period "the market was in charge of interest rates" helped to offload the (political) pressure away from the Reserve Bank of New Zealand.

Overall, when the pros and cons of monetary base control are examined today, it is worth keeping in mind the time when such a strategy was originally promoted. At the time, money markets were not as developed, competitive, unregulated and efficient in transmitting monetary policy decisions as today. Financial systems relied extensively on bank based financing, which increased the role of the credit channel in the transmission mechanism.[28] Today, reflecting the consensus view that short-term interest rates and not quantities enter in the aggregate demand curve, the monetary base is seen as a "clumsy" monetary policy instrument to be used in normal circumstances and the costs related to "unnecessary" volatility of short-term interest rates is regarded very high. By using interest rates as the operational instrument and target, the central bank can define the monetary policy stance more effectively. This precision to define the monetary policy stance can also be related to the credibility of the central bank (Cover and VanHoose (2000)).

In addition, central banks were less independent of political influence to use interest rates to fight the prevailing high inflation rates at the time the monetary base gained some prominence as monetary policy operational target. As argued by Artis and Lewis (1991), interest rate control may be more "politically sensitive" than monetary base control and this may give an advantage to the latter as a policy instrument especially when the political pressure on the central bank is potentially high and its statutory independence low (see also BIS (1980)). However, the general trend towards greater central bank independence should make this desirable property of the monetary base increasingly less important in the future, at least among industrialised countries.

---

[28] See BIS (1980) for an account of the reasons why Spain did not see real alternatives to the quantitative targeting of the monetary base when targeting broader monetary aggregates in 1970s.

IV. Conclusions

This paper has aimed at providing an up-to-date account of the possible roles for the monetary base in monetary policy, looking at the theoretical and empirical literature as well as central bank experience. Overall, our analysis points to four conclusions.

First, the monetary base has been used as an intermediate target through which the central bank aims indirectly at its long run goals of price stability and sustainable economic growth. Germany in the period from 1974 to 1988 and Switzerland up to 1999 represent prominent examples of this strategy, although in the former case the monetary base was seen as a proxy for the broader aggregate M3. The prompt availability of the data and the fact that the monetary base is, in theory, perfectly controllable by the central bank were quoted as the main advantage of this variable vis-à-vis, for instance, broader monetary aggregates.

Second, the monetary base has been used on some occasions as an operational target, namely as a variable which the central bank controls closely in the short term implementation of monetary policy. Traditionally, the uses of the monetary base as an intermediate and operational target have been bound together and pursued in a flexible manner. Either the monetary base has served in both roles, or the monetary base (or bank reserves) have been a part of an indirect control strategy for targeting broader monetary aggregates, which was the case in the U.S. (1979–1982). The monetary base (or bank reserves) has been used as an operational target also outside the context of monetary targeting. The Reserve Bank of New Zealand (until 1999) and the Bank of Japan (from 2001) represent examples of this kind of approach.

Third, an important role of the monetary base is as an information variable, providing input in the assessment of a monetary policy stance defined in terms of a short-term interest rate. Central banks using the monetary base as an information variable have normally an interest rate as an operational target and a monetary aggregate as an intermediate target or a direct inflation target.

Fourth, the monetary base might be a relevant variable in the transmission of monetary policy, although there is still no consensus on this matter in the literature and research is still ongoing, stimulated by the fact that short-term interest rates have reached the zero bound in Japan. Some academics have recently suggested the possibility that the monetary base might provide a separate channel of transmission of monetary

policy in addition to that in short-term interest rates. Changes in the monetary base, according to this theory, would change the composition of the economic agents' portfolios and affect their overall degree of liquidity, hence possibly influencing agents' propensity to save or spend even at unchanged short-term interest rates.

References

Anderson, R. G. and R. H. *Rasche* (2001): "The Remarkable Stability of Monetary Base Velocity in the United States, 1919–1999", Unpublished, July. – *Artis,* M. and M. *Lewis* (1991): Money in Britain. Monetary Policy, Innovation & Europe, Philip Allan. – *Axilrod,* S. H. (1983): "Strategies and Tactics for Monetary Control: A Comment on Brunner and Meltzer", Carnegie Rochester Conference Series on Public Policy; 18(0), spring, pp. 105–112. – *Bank for International Settlements* (1980): The monetary base approach to monetary control, September. – *Bank of Japan* (2001a): "New Procedures for Money Market Operations and Monetary Easing", Announcement of the Monetary Policy Meeting Decisions on 19 March 2001. – *Bank of Japan* (2001b): "Change in the Guideline for Money Market Operations", Announcement of the Monetary Policy Meeting Decisions on 14 August 2001. – *Bank of Japan* (2001c): "Change in the Guideline for Money Market Operations and Reduction in the Official Discount Rate", Announcement of the Monetary Policy Meeting Decisions on 18 September 2001.7 – *Bank of Japan* (2002): "On Today's Decision at the Monetary Policy Meeting", Announcement of the Monetary Policy Meeting Decisions on 28 February 2002. – *Bennett,* P. and S. *Peristiani* (2002): "Are U.S. Reserve Requirements still Effective?", Economic Policy Review of the Federal Reserve Bank of New York, May 2002, 8: 53–68 – *Bernanke,* B. S. and M. *Gertler* (1995): "The Credit Channel of Monetary Policy Transmission", Journal of Economic Perspectives, 9, 4, pp. 27–48. – *Bofinger,* P. and A. *Schächter* (1995): "Alternative Operating Procedures for Monetary Policy – A New Look at the Money Supply Process", Centre for Economic Policy Research Discussion Paper, 1257, October. – *Borio,* C. E. V. (1997): " Monetary policy operating procedures in industrialised countries" Implementation and Tactics of Monetary Policy, BIS Conference Papers, Vol. 3, March, pp. 286–368. – *Breedon,* F. J. and P. G. *Fisher* (1996): "M0: Causes and Consequences", The Manchester School, 64, 4, pp. 371–387. – *Brunner,* K. and *Meltzer,* A. H. (1983): "Strategies and Tactics for Monetary Control", Carnegie Rochester Conference Series on Public Policy; 18(0), Spring, pp. 59–103. – *Bryant,* R. C. (2000): "Comment to: Overcoming the Zero Bound on Interest Rate Policy", Journal of Money, Credit and Banking, 32, 4, pp. 1036–1050. – *Christiano,* L. J., *Motto,* R. and M. *Rostagno* (2003): "The Great Depression and the Friedman-Schwartz hypothesis", forthcoming, Journal of Money, Credit and Banking. – *Clinton,* K. (1997): "Implementation of monetary policy in a regime with zero reserve requirements", Bank of Canada working paper n. 8. – *Clouse,* J., D. *Henderson,* A. *Orphanides,* D. H. *Small,* and P. A. *Tinsley* (2003) "Monetary Policy When the Nominal Short-Term Interest Rate is Zero", Topics in Macroeconomics, Vol. 3, No. 1. – *Costa,* C. and P. *De Grauwe* (2001): "Monetary policy in a cashless society", CEPR discussion paper n. 2696, February.

– *Cover*, J. P. and D. D. *VanHoose* (2000): "Political Pressures and the Choice of the Optimal Monetary Policy Instrument", Journal of Economics and Business, 52, pp. 325–341. – *Deutsche Bundesbank* (1985): "The Longer Term Trend and Control of the Money Stock", in the Monthly Report, January, pp. 13–26. – *Drehmann*, M. and C. A. E. *Goodhart* (2000): "Is cash becoming technologically outmoded? Or does it remain necessary to facilitate "bad behaviour"?", LSE discussion paper n. 358. – *Freedman*, C. (2000): "Comment on: Overcoming the Zero Bound on Interest Rate Policy", Journal of Money, Credit and Banking, 32, 4, pp. 1051–1057. – *Friedman*, B. M. (1988): "Conducting Monetary Policy by Controlling Currency Plus Noise A Comment", Carnegie-Rochester Conference Series on Public Policy, 29, pp. 205–212. – *Friedman*, B. M. (1999): "The Future of Monetary Policy: The Central Bank as an Army with Only a Signal Corps?", International Finance, 2, 3, pp. 321–38. – *Friedman*, B. M. (2000): "Decoupling at the Margin: The Threat to Monetary Policy from the Electronic Revolution in Banking", International Finance, 3, 2, pp. 261–272. – *Friedman*, M. and A. *Schwartz* (1963): A monetary history of the United States, 1867–1960, Princeton University Press. – *Garfinkel*, M. R. and D. L. *Thornton* (1991a): "The Multiplier Approach to the Money Supply Process: A precautionary note", Federal Reserve Bank of St. Louis Review, 73(4), July–Aug., pp 47–64. – *Garfinkel*, M. R. and D. L. *Thornton* (1991b): "Alternative Measures of the Monetary Base: What are the Differences and Are They Important?", Federal Reserve Bank of St. Louis Review, Nov.–Dec., pp. 19–35. – *Goodfriend* (2000): "Overcoming the Zero Bound on Interest Rate Policy", Journal of Money, Credit and Banking, 32, 4, pp. 1007–1035. – *Goodhart*, C. A. E. (1994): "What Should Central Banks Do? What Should Be Their Macroeconomic Objectives and Operations?", The Economic Journal, 104 (November), pp. 1424–1436. – *Goodhart*, C. A. E. (2000): "Can Central Banking Survive the IT Revolution?", International Finance, 3, 2, pp. 189–210. – *Greenspan*, A. (1997): "Remarks by Chairman Greenspan", at the 15th Anniversary Conference of the Center for Policy Research at Stanford University, September 5. – *Guthrie*, G. and J. *Wright* (2000): "Open Mouth Operations", Journal of Monetary Economics, 46, 2, pp. 489–516. – *Hafer*, R. W., J. H. *Haslag* and S. E. *Hein* (1996): "Implementing Monetary Base Rules: The Currency Problem", Journal of Economics and Business, 48, pp. 461–472. – *Hafer*, R. W., D. C. *Wheelock* (2001): "The Rise and Fall of a Policy Rule: Monetarism at the St. Louis Fed, 1968–1986", Federal Reserve Bank of St. Louis Review; 83(1), Jan./Feb., pp. 1–23. – *Haldane*, A. G., *McCallum*, B. T. and C. *Salmon* (1996): "Base money rules in the United Kingdom", The Manchester School Supplement, pp. 1–27. – *Henckel*, T., A. *Ize* and A. *Kovanen* (1999): "Central Banking Without Central Bank Money", International Monetary Fund Working Paper, 92 (July), pages 39. – *Hetzel*, R. L. (2003): "Japanese monetary policy and deflation", Federal Reserve Bank of Richmond Economic Quarterly, 89/3. – *House of Commons Treasury and Civil Service Committee* (1980): "Memoranda on Monetary Policy", Session 1979–1980, 17 July. – *Jefferson*, P. N. (2000): "Home Base and Monetary Base Rules: Elementary Evidence from the 1980s and 1990s", Journal of Economics and Business, 52 (1–2), Jan–April, pp. 161–180. – *King*, M. (1999): "Challenges for monetary policy: new and old", paper prepared for the Symposium on "New Challenges for Monetary Policy", Fed Kansas City, Jackson Hole, 27 August. – *Kiyotaki*, N. and J. *Moore* (2002): "Liquidity, business cycles and monetary policy", working paper, London School of Economics. – *Lapp*, J.

S. (1997): "Monetary Base Outliers as Predictors of Economic Activity", Journal of Economic Research, 2, pp. 239–268. – *McCallum,* B. T. (1987): "The Case for Rules in the Conduct of Monetary Policy: A Concrete Example" Federal Reserve Bank of Richmond Economic Review; 73(5), Sept./Oct., pp. 10–18. – *McCallum,* B. T. (1988): "Robustness properties of a rule for monetary policy". Carnegie Rochester Conference Series on Public Policy; 29(0), Autumn, pp. 173–203. – *McCallum,* B. T. (1997): "Issues in the design of monetary policy rules" NBER Working Paper Series, 6016. – *McCallum,* B. T. (2000): "Theoretical Analysis Regarding a Zero Bound on Nominal Interest Rates", Journal of Money, Credit and Banking, 32, 4, pp. 870–904. – *Meltzer,* A. H. (1998): "Time to Print Money", Financial Times, July 17. – *Meltzer,* A. H. (1999a): "Comments: What More Can the Bank of Japan Do?", Monetary and Economic Studies, 17(3), December, pp.189–191. – *Meltzer,* A. H. (1999b): "The Transmission Process", prepared for the Deutsche Bundesbank conference on the Monetary Transmission Process, March. – *Meulendyke,* A.-N. (1990): "Possible Roles for the Monetary Base", Federal Reserve Bank of New York, Intermediate targets and indicators for monetary policy: A critical survey, pp. 20–66. – *Mishkin,* F. S. (1995): The Economics of Money, Banking and Financial Markets, 4th ed., Harper Collins Publishers. – *Nelson,* E. (2002): "Direct effects of base money on aggregate demand: theory and evidence", Journal of Monetary Economics, 49, 4, pp. 687–708. – *Nelson,* E. (2003): "The future of monetary aggregates in monetary policy analysis", Journal of Monetary Economics, 50, 5, pp. 1029–1059. – *Poole,* W. (1970): "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model", Quarterly Journal of Economics, 84(1), pp. 197–216. – *Rasche,* R. and J. *Johannes* (1987): Controlling the growth of monetary aggregates, Boston, Kluwer Academic Publishers. – *Reischle,* J. (2001): "The role of the analysis of the consolidated balance sheet of the banking sector in the context of the Bundesbank's monetary policy strategy prior to Stage Three", in ECB, proceedings of the seminar Framework and tools of monetary analysis, 20–21 November 2000, Frankfurt am Main. – *Reserve Bank of New Zealand* (2000): "Monetary policy implementation: changes to operating procedures" and "A cash rate system for implementing monetary policy", Economic Bulletin, 62, 1. – *Rich,* G. (1997): "Monetary targets as a policy rule: Lessons from the Swiss experience", Journal of Monetary Economics, 39, pp. 113–141. – *Rich,* G. (2000): "Monetary Policy without Central Bank Money: A Swiss Perspective", Paper based on the speech held at the Conference on the Future of Monetary Policy, Washington D.C., 11 July 2000. – *Rudebusch,* G. and L. *Svensson* (2002): "Eurosystem monetary targeting: lessons from US data", European Economic Review, 46, pp. 417–442. – *Sellon,* G. H. and S. E. *Weiner* (1996): "Monetary policy without reserve requirements: analytical issues", Federal Reserve Bank of Kansas City Economic Review, 81, 4, pp. 5–24. – *Thornton,* D. L. (1982): "Simple Analytics of the Money Supply Process and Monetary Control", Federal Reserve Bank of St. Louis Review; 64(8), October, pp. 22–39. – *Thornton,* D. L. (1988): "The Borrowed-Reserves Operating Procedure: Theory and Evidence", Federal Reserve Bank of St. Louis Review; 70(1), Jan./Feb., pp. 30–54. – *White,* J. B. (2001): "Central banking: back to the future", Reserve Bank of New Zealand, discussion paper n. 5, September. – *Woodford,* M. (2001): "Monetary policy in the information economy", NBER working paper n. 8674. – *Woodford,* M. (2003): Interest and prices: Foundations of a Theory of Monetary Policy, Princeton University Press.

Summary

What is the Role of the Monetary Base in Monetary Policy Today?

This paper provides a selective and up-to-date review of the literature on the possible roles of the monetary base in monetary policy. The paper emphasises that, while the monetary base lies at the core of central banking and is the ultimate instrument allowing central banks to exert influence over interest rates and ultimately over macroeconomic conditions, it has seldom played a significant role in formulating and implementing monetary policy. In particular, the monetary base has very seldom been used as a sole operational target and the experience with the monetary base as an intermediate target is also rather limited. Today, for most central banks the monetary base appears to be at most an information variable. However, the debate over monetary policy when interest rates hit the zero bound and some recent theoretical advances have recently revived the academic and policy interest in the monetary base. (JEL E51, E52, E58)

Zusammenfassung

Welche Rolle spielt die monetäre Basis in der Geldpolitik von heute?

Dieser Beitrag enthält eine selektive und zeitgerechte Darstellung der Literatur über die möglichen Rollen der monetären Basis in der Geldpolitik. Er unterstreicht, dass, während die monetäre Basis den Kern des Zentralbankgeschäfts bildet und letztlich das Instrument ist, das es den Zentralbanken gestattet, die Zinssätze und schließlich auch die makroökonomischen Bedingungen zu beeinflussen, die monetäre Basis selten eine signifikante Rolle bei der Formulierung und Implementierung der Geldpolitik gespielt hat. Insbesondere hat die monetäre Basis nur sehr selten als das einzige operationelle Ziel gegolten, und die Erfahrung mit der monetären Basis als ein Zwischenziel ist ebenfalls recht begrenzt. Heute scheint die monetäre Basis für die meisten Zentralbanken allenfalls eine Informationsvariable zu sein. Dennoch hat die Debatte über die monetäre Basis – in einer Zeit, in der die Zinssätze gegen Null tendieren – sowie über gewisse theoretische Fortschritte, welche die monetäre Basis zu der Zinslücke in einem „Neo-Wicksellianischen" Rahmen in eine Beziehung setzen, seit kurzer Zeit das akademische und das politische Interesse an der monetären Basis neu belebt.

Résumé

Quel est aujourd'hui le rôle de la base monétaire dans la politique monétaire?

Cet article présente une revue sélective et moderne de la littérature concernant les rôles possibles de la base monétaire dans la politique monétaire. Alors que la base monétaire constitue le noyau du système de la banque centrale et qu'elle est l'instrument suprême qui permet aux banques centrales d'exercer une influence sur les taux d'intérêt et, finalement, sur les conditions macroéconomiques, il est souligné ici qu'elle a rarement joué un rôle significatif pour formuler et mettre en

oeuvre la politique monétaire. En particulier, la base monétaire a rarement été utilisée comme unique objectif opérationnel et l'expérience avec la base monétaire comme objectif intermédiaire est également assez limitée. Aujourd'hui, pour la plupart des banques centrales, la base monétaire apparaît au plus comme une variable d'information. Pourtant, le débat sur la politique monétaire dans le cas de taux d'intérêt très bas et quelques théories qui font la relation entre la base monétaire et l'écart des taux d'intérêts dans un cadre néo-wicksellien ont ravivé récemment l'intérêt académique et politique de la base monétaire.