

Interest rate policy or monetary base policy : implications for a central bank's balance sheet

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Introduction

The primary objective of the euro area's monetary policy is price stability. That is why the Eurosystem bases its monetary policy strategy primarily on a quantitative definition of price stability. The ECB Governing Council defines price stability as a year-on-year increase in the HICP for the euro area of less than – but close to – 2 p.c. in the medium term. There can therefore be no doubt about the ultimate objective of monetary policy, even if the medium-term orientation of this definition provides the necessary scope for a gradual approach to avoid undesirable volatility in economic activity and interest rates.

Furthermore, the monetary policy strategy is based on an analytical framework comprising two pillars, namely the economic analysis and the monetary analysis. The former assesses the economic and financial developments and the inherent risks to price stability. The latter examines developments in the money supply, lending and their components, and looks for signals of relevance for longer-term inflationary trends. Although the Eurosystem's monetary policy strategy accords an important role to the movement in the money supply, it does not react mechanically to monetary developments. In other words, movements in the money supply do not constitute an intermediate target. Nor does the economic analysis provide an intermediate objective. For example, the Eurosystem does not react mechanically to the inflation projections. In contrast, the Governing Council's decision-making process is very broad, and is based more specifically on the signals which

appear relevant once both types of information have been cross-checked.

In the very short term, the Eurosystem uses its open market operations to steer the money market interest rate. This implies that, in practice, the Eurosystem conducts an interest rate policy, which means influencing the term structure of interest rates by steering the short-term interest rate, and thus also influencing the real economy, the money supply and inflation. For that purpose, at the beginning of each month the Governing Council determines the key rates which indicate the monetary policy stance. The minimum bid rate of the main refinancing operations is particularly important here. The operational framework for conducting monetary policy is designed to stabilise the overnight interest rate at the level of the minimum bid rate set by the Governing Council. Another article in this Economic Review gives a detailed description of how this mechanism works.⁽¹⁾ In theory, however, other options are also possible. For instance, the central bank could actively manage the monetary base, also known as central bank money (see the definition below for more details) instead of the money market interest rate, which in principle should make it possible to influence money creation on the part of credit institutions, and hence the real economy and inflation. Since the monetary base concept is closely linked to the money

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(1) Aucremanne, L., J. Boeckx and O. Vergote (2007): "The liquidity management of the Eurosystem during the period of financial market turmoil", *National Bank of Belgium Economic Review*, 27-41.

supply concept, and given the primary role of the money supply in the monetary policy strategy, one might even think that the monetary base is perhaps a better target. This article reviews the advantages and disadvantages of these two options and clearly explains the reasons why central banks of countries with well-developed financial markets nowadays prefer to steer short-term interest rates rather than the monetary base. Finally, the article also demonstrates that the pursuit of either of these objectives has specific consequences for the dynamics of a central bank's balance sheet and for its interpretation. More particularly, the article shows that a policy of steering interest rates implies that the central bank's balance sheet is endogenous and therefore no longer supplies information on the monetary policy stance. The sometimes abundant provision of liquidity during the period of financial turmoil that began in the summer of 2007 – and which forms the subject of another article in this Economic Review – therefore performs no function in signalling the monetary policy stance.

The article is arranged as follows. The first section briefly examines the link between the central bank balance sheet, the monetary base, the total money supply and lending. The second section focuses on the choice of either the interest rate or the monetary base as the operational target, and identifies the factors which determine the choice made by central banks. Finally, the article examines how a policy of steering interest rates affects the interpretation of a central bank's balance sheet.

1. A central bank's balance sheet and the money supply

The Eurosystem's balance sheet is closely linked to the money market. The liabilities side of the balance sheet records the monetary base, which stands for the most liquid forms of money, and central banks have a monopoly on its creation. That explains why it is also called central bank money. The monetary base comprises the fiduciary issue (banknotes and coins in circulation), the reserves (largely compulsory) held by the counterparties of the Eurosystem, and recourse to the deposit facility. The monetary base can be regarded as the basic component of the total money supply which, apart from banknotes in circulation, comprises book-entry money issued by credit institutions. The box explains the precise operation of this principle whereby "loans make deposits".

Regarding the creation of book-entry money, it should be noted that there are various forms of deposits and that it is their degree of liquidity (i.e. convertibility to means of payment) that distinguishes them from one another.

Given that the nature and characteristics of financial assets, transactions and means of payment vary over time, it is not always easy, *a priori*, to define money. The movement in a number of monetary aggregates is therefore analysed, taking account of the fact that a narrow aggregate may omit movements in substitutes similar to money, while a broad aggregate may overestimate the function of money as a means of payment. These monetary aggregates differ in the degree of liquidity of the component assets.

The narrow monetary aggregate M1 comprises fiduciary money (banknotes and coins) and sight deposits. The latter can be converted into cash immediately or used for book-entry payments. The intermediate monetary aggregate M2 comprises M1 plus time deposits at up to two years and deposits redeemable at up to three months' notice. These deposits can be converted into M1 components, but in some cases there may be restrictions, such as a period of notice, penalties or fees. The difference between the intermediate monetary aggregate and the narrow aggregate (M2-M1) can be described as other short-term deposits. The broad monetary aggregate M3 comprises M2 plus certain tradable instruments issued by monetary financial institutions (MFIs), which also include credit institutions. These tradable instruments are repurchase agreements, money market fund shares/units and debt instruments with a maturity of up to two years (including money market paper). Owing to their high degree of liquidity, these instruments are close substitutes for deposits. Since they are included in M3, this aggregate is less affected by transfers between the various liquid asset categories than the narrower monetary aggregates, and is therefore more stable. The difference between the broad and intermediate aggregates (M3-M2) can be described as tradable instruments.

Since the creation of the European monetary union, there has been a great deal of substitution between the various M3 components, so that this broad aggregate has proved to be more stable than the narrower aggregates. In particular, since the end of 2005, the strong expansion of M3 has been less and less influenced by the narrow monetary aggregate and is increasingly affected by other short-term deposits and tradable instruments. The period of rising interest rates which began in December 2005 in fact makes cash and sight deposits less attractive than other short-term deposits or tradable debt instruments on which the remuneration stays more closely in line with money market interest rates.

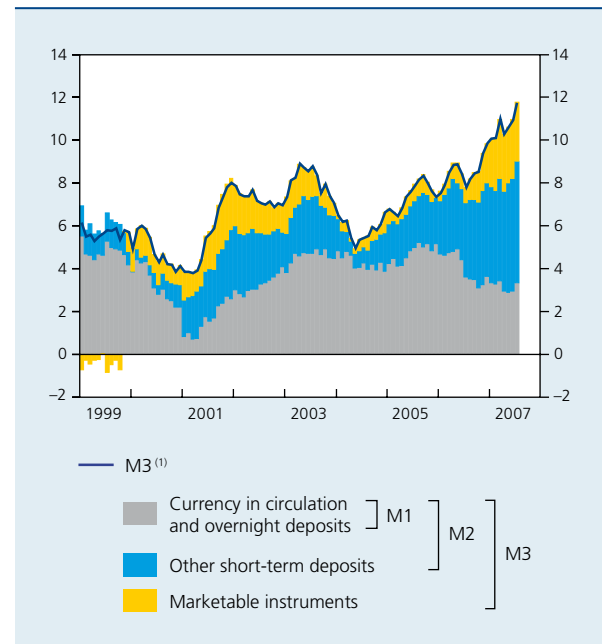
So far, the interest rate hikes have only triggered substitution effects between the various components of M3, without modifying the general dynamic, as is evident from

the M3 growth which came to 11.3 p.c. in September 2007. That dynamic is driven to a considerable extent by portfolio reallocation, essentially because the relatively flat yield curve enhances the attraction of short-term investments, some of which are included in M3. Moreover, less risky assets have probably tempted more investors recently, in view of the financial market volatility. There had already been substantial portfolio reallocations previously, after the bursting of the technology bubble between 2001 and 2003, when residents had liquidated foreign assets and then invested the money in less risky assets included in M3. It is also possible that the substantial growth of the money supply is due to a structural change in behaviour causing a break in the demand for money in response to the new environment of stable prices and low interest rates. It is precisely because of the difficulty in determining in real time the extent to which demand for money is generated by a transaction motive – as that is the main type of demand affecting price stability – that the monetary analysis, important though it is, is only one of the factors influencing the Governing Council's monetary policy decisions. Moreover, it is assumed that the monetary analysis essentially signals the risks to price stability in the medium and long term. At those horizons, portfolio reallocations have a less marked effect on monetary dynamics.

CHART 1

M3 AND ITS COMPONENTS

(data adjusted for seasonal and calendar effects; contribution to the change in M3 compared to the corresponding month of the previous year, percentage points unless otherwise stated)



Source : ECB.

(1) Percentage changes compared to the corresponding month of the previous year.

Box – Money multipliers and their behaviour since 1999

The use of the term “monetary base” originates from the fact that it can be regarded as the basic component of the total money supply. Apart from banknotes and coins, it also includes the short-term deposits held with MFIs and generated in accordance with the principle that “loans make deposits”. Credit institutions are able to lend to the public the reserves at their disposal. After use, these funds are re-deposited – not necessarily with the same bank, but that aspect is irrelevant since the analysis concerns the banking sector as a whole – before being lent again and re-deposited by the public. However, the monetary expansion which this process creates is limited by the reserve requirements which credit institutions have to respect and by the public's preference for banknotes.

Thus, supposing the central bank sets a 10 p.c. ratio for the reserve requirements and, via an open market operation, buys a security worth 100 from a bank. The money is paid into the reserve account, which the credit institution holds with the central bank, causing an increase in the excess reserves and hence in the monetary base of 100 (t=1). The credit institution can convert its excess reserves into a loan, so that the associated formation of a deposit will initially lead to an increase in the money supply (M) of 100 (t=2). The banks have to hold 10 p.c. of this sum in the form of required reserves. The required reserves therefore increase by 10 and the excess reserves are reduced by 10. If the public always wants to retain 10 p.c. in the form of banknotes, then the notes in circulation and the money supply increase by 10. Conversely, the excess reserves are again reduced by 10, bringing them down to 80. 80 is therefore the maximum that can be lent (t=3), which causes another increase in the required reserves and banknotes amounting to 8, while the excess reserves are reduced by the same amount each time.

If this process continues, the deposits will ultimately increase by 500 and banknotes by 50, so that the total money supply will expand by 550 while the original amount injected was 100. The ratio between the monetary base and the money supply is represented by the money multiplier $\Delta M/\Delta MB$, which in this example is 5.5.

MONEY CREATION AND THE MONEY MULTIPLIER

(consequences of the reserve requirements and the preference for banknotes)

	t = 1	t = 2		t = 3		Cumulative effect
Monetary base	+100					100
Reserves:						
Excess	+100	-10	-10	-8	-8	0
Compulsory		+10		+8		50
Banknotes			+10		+8	50
Deposits		+100		+80		500
Money supply		+100	+10	+80	+8	550

Taking account of the factors cited, it is possible to formulate a money multiplier. For this purpose, the preference for banknotes (c) and the reserve requirement ratio (r) are defined respectively as the banknotes in circulation and the required reserves as ratios of the total volume of deposits held with the MFIs. The total money supply can then be expressed as a multiple of the monetary base:

$$M = (1+c)/(c+r)MB.$$

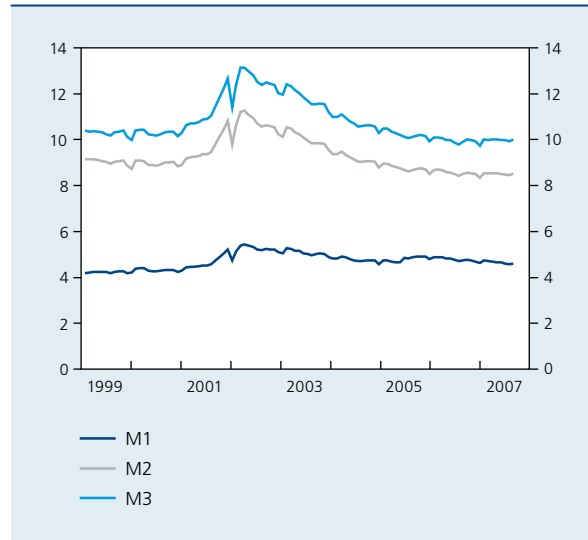
This formula clearly reveals that the money multiplier declines in the event of an increase in the reserve requirement ratio or the preference for banknotes.

This mechanism implies that the major part of money creation takes place outside the central bank and is reflected in the consolidated balance sheet of the MFIs in the form of deposits. The banknotes and coins are also recorded on the consolidated balance sheet of the MFI sector, since the latter also comprises the central bank. The reserves which credit institutions hold with the central bank do not appear on the consolidated balance sheet, since they constitute both credit institution assets and central bank liabilities. They are therefore not included in the total money supply.

By calculating the ratio between the various monetary aggregates and the monetary base, it is possible to obtain a money multiplier for each aggregate. In this context, what matters is not so much the level of the multiplier but rather its movement over time. A stable multiplier would mean that the central bank could manage the aggregate money supply by controlling the monetary base. As will be explained later, a stable multiplier is therefore one of the conditions for steering the monetary base rather than interest rates.

Since the move to monetary union, the money multipliers initially increased before gradually reverting to their original level. That movement is attributable to the introduction of euro banknotes and coins, which briefly exerted a negative effect on the use of fiduciary money, and hence on the monetary base. This event had very little influence on the aggregate M3, since it involved substitution between two components of the broad money supply, thereby driving up the money multiplier. Although this was a single instance illustrating a very unstable multiplier, it is evident that the money multiplier is generally unstable. That instability is due to financial innovations

MONEY MULTIPLIERS
(ratios base on monthly data⁽¹⁾)



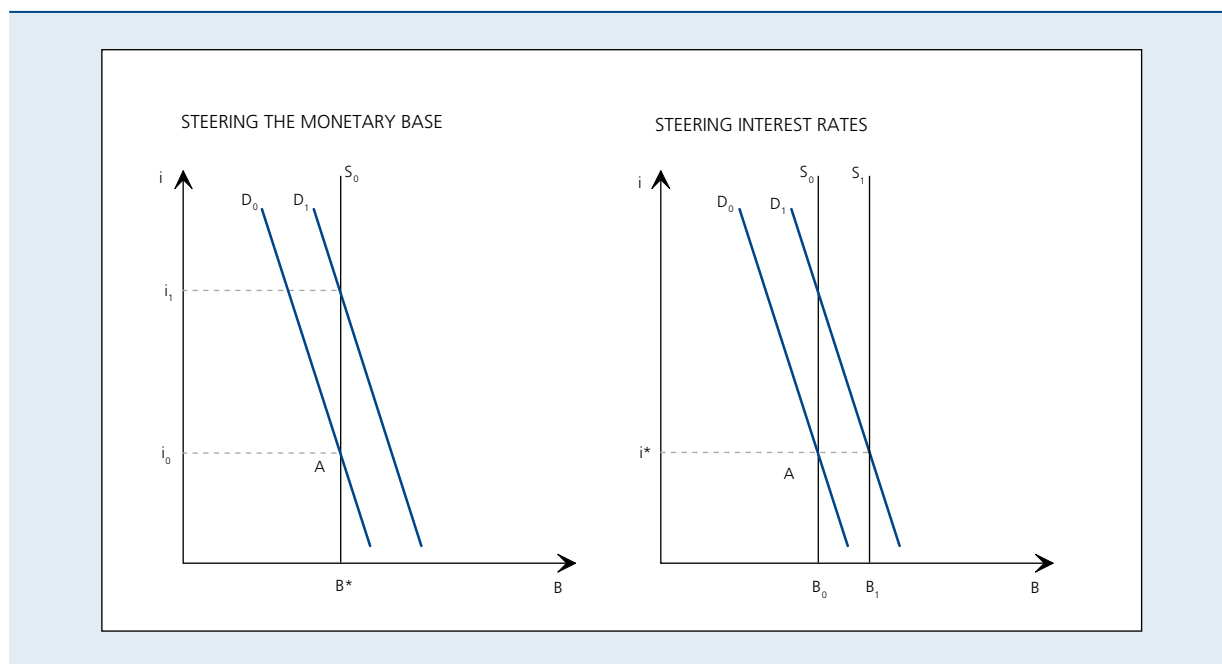
Sources : ECB, NBB.
(1) Ratio between monetary aggregates and monetary base.

and structural adjustments that are difficult for the central bank to predict. Modest fluctuations in the multipliers generate large fluctuations in the aggregates, hampering the conduct of a monetary base policy. Moreover, such a policy should be conducted from day to day, so that in this context it would be necessary to calculate the relevant variability of the money multipliers on the basis of daily data (which are not available) on the monetary aggregates, rather than monthly data. On a daily basis the multipliers are most probably even more volatile. Thus, it is rather unlikely that the granting of sometimes abundant liquidity, as occurred in the period of financial turmoil, forming the subject of a separate article in this Economic Review, will have exerted a proportionate effect on the total money supply. It therefore points instead to a sudden fall in the money multiplier (see also Bini Smaghi (2007) on this subject).

2. Monetary base policy versus interest rate policy

A central bank chooses between a monetary base policy and an interest rate policy. In so far as it has a monopoly on the creation of the monetary base, it can fix either the price i or the quantity B . In other words, it can choose a point on the liquidity demand curve and arrive at that point either by fixing the level of the monetary base or by fixing the level of interest rates. Under stable market conditions, the choice between price and quantity is irrelevant. Thus, to arrive at point A on the demand curve D_0 , the central bank can either announce a monetary base level equal to B^* , which implies an interest rate i_0 , or announce an interest rate equal to i^* and, to achieve

that, adjust the monetary base to B_0 . The two procedures lead to the same outcome. However, if liquidity demand becomes unstable as a result of shocks, the effect on interest rates and on the monetary base will depend on the chosen target. Thus, in the case of a policy of steering the monetary base, if demand shifts from D_0 to D_1 , the monetary base will be unchanged so that the increased demand will not be met and the interest rate will increase from i_0 to i_1 . The interest rate fluctuations will be larger the lower the elasticity of demand for liquidity, which corresponds to a steep demand curve. In the case of a policy of steering interest rates, demand for extra liquidity will prompt the central bank to provide additional liquidity in order to keep the interest rate unchanged, and the monetary base will increase from B_0 to B_1 . That therefore



implies that the monetary base may vary in the case of a policy of steering interest rates, whereas it is the interest rate that may fluctuate in the case of a policy of steering the monetary base. That is why the two procedures are mutually exclusive. If the central bank chooses to steer the interest rate, the monetary base varies and the central bank cannot control it. Conversely, if the central bank chooses to steer the monetary base, the interest rate cannot be fixed.

The choice between steering the monetary base or the interest rate depends on the stability of their relationship with the final target. The link between the instrument and the operational target is normally strong, since the refinancing operations are an efficient monetary policy instrument. However, when market conditions are unstable, the central bank may experience more problems in attaining very precisely the operational target which it has set itself (see another article in this Economic Review for a discussion of liquidity management during the recent period of financial turmoil).

The ease of controlling a monetary aggregate such as M3 by means of the monetary base depends on the stability of the money multiplier. The stability of demand for money also plays a vital role in the link between the money supply and inflation. Conversely, the transmission of a policy of steering the interest rate depends more on the interest rate term structure than on the monetary aggregates. Since the level of interest rates influences

investment and consumption decisions, the stability of aggregate demand is a key factor in this case. In short, the choice between one operational target or the other can only be made by viewing the relative stability of the money multiplier and money demand in the context of the stability of aggregate demand.

Generally speaking, an economy is affected by both aggregate demand and money demand shocks. The best choice of operational target therefore does not depend on the occurrence of specific shocks, but rather on their relative strength. Using a simple model, Poole (1970) demonstrated that the choice between steering the interest rate or steering the monetary base depends on the scale of the shocks affecting the money demand in relation to those affecting aggregate demand.⁽¹⁾

The effect of these various shocks can be illustrated by a graph of the IS-LM model, in which the IS curve reflects equilibrium on the goods market and LM represents equilibrium on the money market.⁽²⁾ Equilibrium on the goods market implies a negative relationship between the level of interest rates (i) and economic activity (Y), because a higher interest rate makes investment and consumption less attractive. Equilibrium on the money market implies a positive relationship between interest rates and economic activity, since a higher level of activity generates increased

(1) Cf. Walsh (2003) for more details.

(2) Cf. e.g. Mishkin (2000).

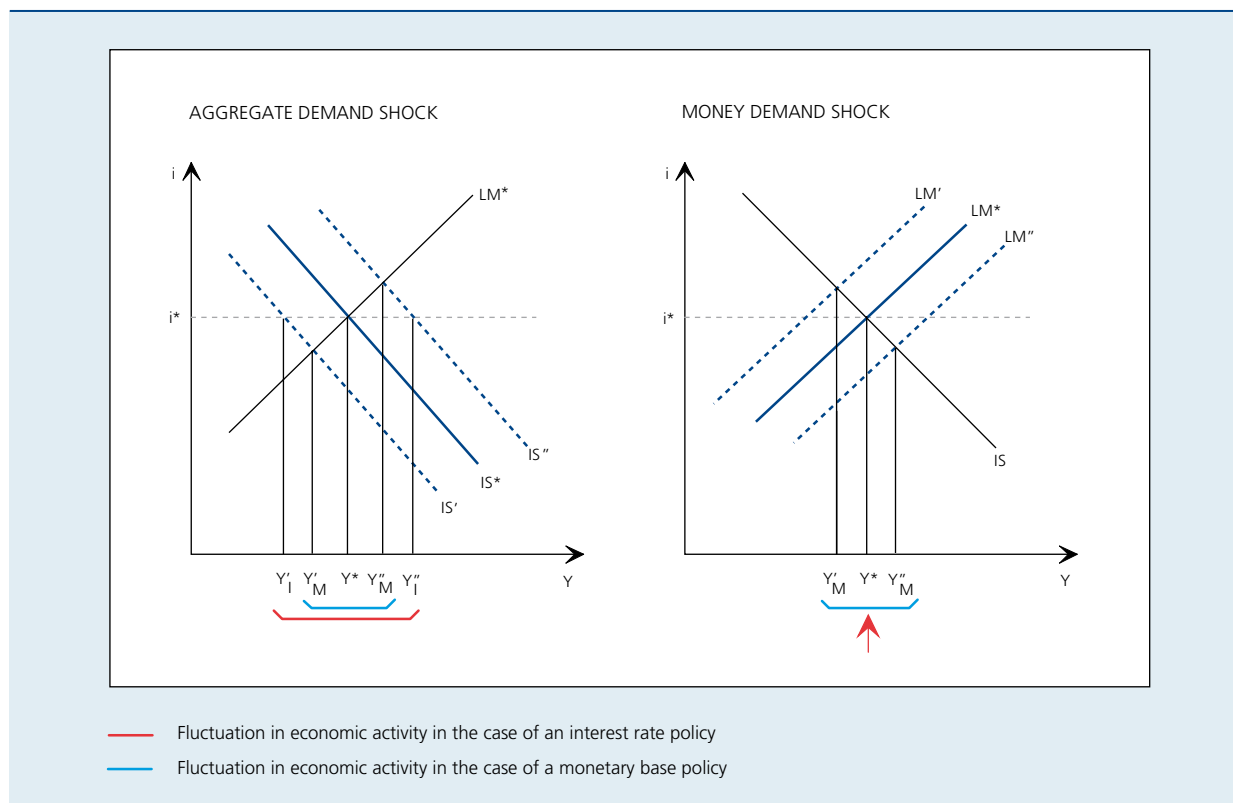
demand for money. That in turn leads to an increase in the interest rate if the supply of money is unchanged. The two markets are simultaneously in equilibrium at the point where the two curves intersect: that is the case at interest rate i^* and activity level Y^* . This graph, which provides a clear illustration of the effect of the various shocks, is nevertheless based on a number of assumptions. First, for simplicity, the price level is disregarded so that inflation expectations are absent and it is only the nominal interest rate that matters (it then corresponds in fact to the expected real interest rate). Second, the ultimate aim of the central bank in this example is no longer the maintenance of price stability but stabilisation of the level of activity, which can be interpreted as the output gap. A more realistic representation of the economy should also consider the aggregate supply, which links the output gap and inflation, although that is not strictly necessary to illustrate the factors determining the choice of operational target. However, this simplified presentation is not unrealistic, since fluctuations in the output gap do in fact have an impact on inflation.

When an economy encounters shocks affecting aggregate demand, IS oscillates around its equilibrium position, IS^* . In the example, the IS curve moves between IS' and IS'' . If the central bank has opted for the interest rate as its

operational target, it lets the money supply vary (causing a shift in the LM curve) in order to keep interest rates constant. Ultimately, output will therefore vary between Y_I' (if the shock is negative) and Y_I'' (if the shock is positive). If the operational target is the monetary base, the central bank does not intervene (LM remains unchanged), leading to variations in interest rates. These movements moderate the effect on output, which moves between Y_M' and Y_M'' . In fact, a negative shock affecting demand causes interest rates to fall, curbing the contraction of activity. Conversely, a positive shock affecting demand causes interest rates to rise, slowing down the expansion of activity. Since the monetary base policy entails a smaller variation in economic activity, it is preferable in that case to opt for such a strategy rather than an interest rate policy, as to some extent it generates interest rate fluctuations which attenuate the impact on economic activity of the shocks affecting aggregate demand.

In the case of shocks affecting money demand, the LM curve becomes uncertain and unstable. The expected LM curve is LM^* , but following these shocks LM oscillates between LM' (if the shock is positive) and LM'' (if the shock is negative). In the case of an interest rate policy, the money supply is adjusted to bring the LM curve back to its original level and keep interest rates unchanged.

CHART 3 CHOICE BETWEEN A MONETARY BASE POLICY AND AN INTEREST RATE POLICY



A constant interest rate (and an unchanged IS curve) has no effect on output. In the case of a monetary base policy, the LM curve can shift, causing interest rates to change. A rise in demand for money pushes up the interest rate, causing output to fall to Y'_M , while a decline in demand for money causes interest rates to fall so that output increases to Y''_M . As the variations in interest rates induced by a monetary base policy are not desirable in the absence of shocks affecting aggregate demand, an interest rate policy is to be preferred. Unlike the monetary base policy, it does not cause inefficient fluctuations in output in the event of shocks affecting money demand.

An interest rate policy is preferred where money demand is relatively unstable and money demand shocks predominate. Conversely, a monetary base policy is preferred where aggregate demand is relatively unstable and hence where shocks affecting aggregate demand predominate. The impact also differs according to the economy's sensitivity to the various shocks, which is reflected in the slope of the IS and LM curves. In short, the more frequent the money demand shocks and the greater their impact on the real economy – reflected in a flat IS curve and a steep LM curve – the more an interest rate policy is to be preferred.

It is clear from the box above that the money multiplier is unstable. The link between the movement in M3 and prices is also rather unstable in the short term, as portfolio adjustments may play a dominant role in determining demand for money. Moreover, the instability of money demand on a daily basis, like the money multiplier, is probably greater than suggested by the monthly data used to examine the movement in M3. The finding that instability increases in the event of a switch to a daily frequency (relevant for the operational conduct of monetary policy) is also valid for the IS curve, but probably more so for the LM curve. Consequently, that switch reinforces the comparative advantage of an interest rate policy. Applied to the sometimes large increase in demand for liquidity during the period of financial market tension which began in August 2007 – concerning money demand shocks rather than shifts in aggregate demand – this framework implies that it is desirable to stabilise interest rates in such an environment (see also Noyer (2007) on this subject).

Like the Eurosystem, many central banks of industrialised countries with well-developed financial markets display a preference for an interest rate policy. Interest rates also make it possible to give a clear signal, probably better than a monetary base policy where opposing movements in the different aggregates could cause confusion. Moreover, money market interest rates can be constantly monitored, making this policy more transparent, whereas

the aggregates can only be examined less frequently and after a time lag. Lower interest rate volatility also makes it easier for banks to manage their liquidity.

The fact that the Eurosystem's operational framework gives priority to interest rates does not, however, imply that monetary developments are of no importance in the attainment of the ultimate objective, namely price stability. The growth of the money supply is not steered, but it is examined as an element in the monetary analysis which, like the economic analysis, forms a separate pillar of the Eurosystem's monetary policy strategy. That key role is based in particular on the close link apparent in the past between fundamental movements in the growth of the money supply and fundamental movements in inflation. These fundamental movements are based on medium- and long-term developments, i.e. horizons relevant for the monetary analysis. At those horizons, the instability problems mentioned above, which could seriously disrupt the operational conduct of monetary policy, are in principle less acute. However, as already stated, a detailed analysis of monetary developments is still needed in order to arrive at an accurate assessment of their impact on price stability.

3. Implications of an interest rate policy for a central bank's balance sheet

The choice of the operational target has implications for the movement in, and interpretation of, the items on a central bank's balance sheet and short-term interest rates. If a central bank opts for an interest rate policy, the rate signals the monetary policy stance. Money market liquidity is managed in order to align money market interest rates with the key interest rate. Even under tense market conditions such as those experienced since August 2007, appropriate liquidity management enabled the Eurosystem to preserve the signalling function of the monetary policy stance performed by money market interest rates. The supply of liquidity is therefore adjusted to demand, so that fluctuations in demand for liquidity cause changes in the balance sheet items of the central bank, making that balance sheet endogenous. Thus, the amount of banknotes recorded on the consolidated balance sheet of the Eurosystem reflects demand at the prevailing interest rate, so that the banknotes can be regarded as an autonomous factor in an analytical presentation of the Eurosystem's consolidated balance sheet. The amount of the current account assets held with the Eurosystem reflects the banking system's demand for central bank reserves. That also means that the sometimes substantial injections of liquidity, implying a strong increase in current account assets held with the Eurosystem, do not give any signal

regarding the monetary policy stance, and in particular do not herald any easing of policy.

Furthermore, the reserve requirements are not an active monetary policy instrument. Although in theory they make it possible to curb money creation, this is not an efficient instrument. In particular, it would be necessary to make tiny adjustments to the reserve ratio in order to adjust the money supply, while the effect of those adjustments would be difficult to estimate in view of the instability of the money multiplier. Moreover, frequent changes to the reserve ratio would make it singularly complicated for credit institutions to manage their liquidity. Conversely, the reserves do perform two other more technical functions in the Eurosystem's operational framework. First, the reserve requirements generate automatic demand for central bank reserves, thus boosting the structural demand for liquidity. Credit institutions therefore depend on the Eurosystem to satisfy this refinancing requirement, which facilitates liquidity management. Second, they act as a liquidity buffer, facilitating the banks' liquidity management. It is precisely because the reserve requirement applies to the average assets held on current accounts with the Eurosystem over the reserve maintenance period that credit institutions can easily smooth the effects of unexpected variations in liquidity. This mechanism is also intended to stabilise money market interest rates during the reserve maintenance period, an effect which obviously disappears at the end of that period. In the case of the Eurosystem, the reserve requirements therefore have an operational function independent of the monetary policy stance which the Governing Council wishes to signal.

The pursuit of an interest rate policy implies that the central bank's balance sheet is endogenous. Demand for liquidity is satisfied by the central bank in order to stabilise the interest rate at the desired level. Fluctuations in demand for liquidity therefore lead to changes in the balance sheet items. That also indicates that it is not the monetary base but rather interest rates that signal the monetary policy stance. The choice of an interest rate policy is not at odds with the important role of money in the Eurosystem's monetary policy strategy. Attainment of the ultimate objective in fact concerns a different horizon – the medium term, according to the definition of price stability – as opposed to the operational conduct of monetary policy where it is the very short term that matters. The comparative advantage of monetary analysis as an indicator of risks to price stability applies primarily in the medium and long term.

Conclusion

This article looked at the link between the balance sheet of a central bank, the monetary base, the monetary aggregates and lending in the euro area. It also considered how these elements influence the Eurosystem's ultimate objective, namely price stability. In addition, it paid special attention to the choice of the operational target. It emerged that conditions are more favourable to the conduct of an interest rate policy than the conduct of a monetary base policy, as the uncertainty generated by money demand shocks and money multiplier instability is more apparent than that generated by aggregate demand shocks, particularly in the very short term which is the relevant horizon for the operational conduct of monetary policy. That is why the central banks of countries with well-developed financial markets currently conduct an interest rate policy.

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