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Monetary Policy in Euroland

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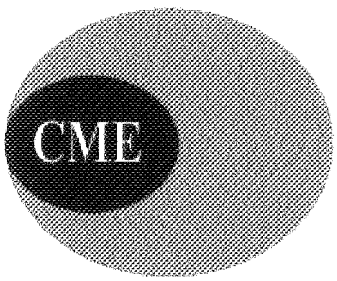

Centre for Monetary Economics

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[1] I have benefited from the comments of Jan Abraham, Roel Beetsma, Martin Fase, and Jean-Jacques Rey.

1. Introduction

In this paper we analyse some of the problems that the monetary authorities are facing and will continue to face in the future. We first identify the major problem with which the ECB will be confronted, i.e. how to conduct monetary policies in a union where asymmetric shocks occur and where the same shocks are transmitted differently among member countries. We then shift our focus towards the formulation of ultimate and final targets of monetary policy. In this connection, we will discuss the ECB "Monetary Policy Strategy".

2. Central Banking and asymmetries of shocks

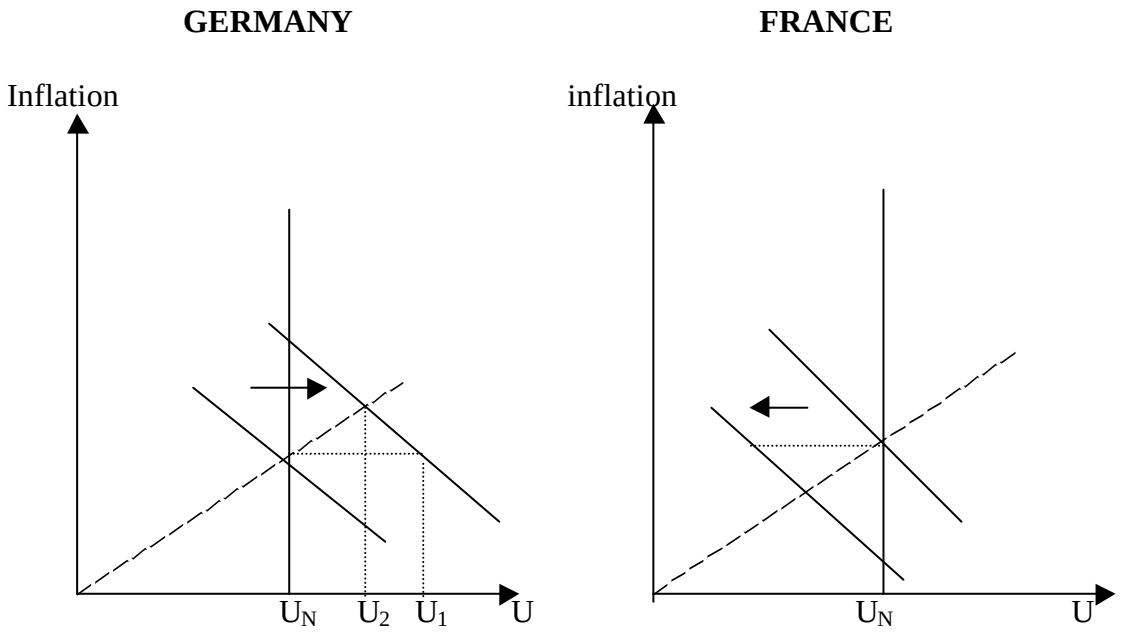
Euroland is likely to ~~o ex~~perience asymmetric shocks. How will the existence of such asymmetries affect policy-making by the ECB? In figures 1 and 2 we analyse this issue by presenting a two-country version of the Barro-Gordon model[2]. The negatively sloped lines are the short-term Phillips curves. The vertical lines are the long-run Phillips curves corresponding with the natural unemployment rate (U_N). The upward sloping dotted lines are the optima stabilisation lines. These show how the authorities optimally adjust the inflation rates to unanticipated shocks in unemployment. (In appendix we show how these stabilisation lines can be derived from the Barro-Gordon model).

We first analyse the effects of a 'pure' asymmetric shock. We then contrast it with a 'pure' symmetric shock. In figure 1 we study the asymmetric shocks. We show one country experiencing a sudden decline in unemployment (France), the other an increase (Germany), and assume that the positive shock in one country is exactly offset by the negative shock in the other country. This assumption makes it a pure asymmetric shock. The ECB, which is responsible for maintaining price stability and for stabilising the economy *in Euroland as a whole* aggregates the numbers. As a result, when observing the economic conditions prevailing in Euroland, it will decide that since inflation and unemployment have remained unchanged, no change in policies is called for. As can be seen from figure 1, the result is a greater fluctuation in

unemployment in the individual countries. In the recession country, unemployment increases to U_1 which exceeds the increase one would obtain if the central bank were able to take action to deal with the shock occurring in that country. The opposite holds in booming country.

In this extreme case of a pure asymmetric shock, the ECB never stabilises. The ECB is completely paralysed. It behaves as if the weight it attaches to unemployment stabilisation is zero. As a result, unemployment (and output) in the individual countries fluctuate not around positive expansion paths but around a horizontal line. The ECB will be perceived as super conservative in the countries involved.

Figure 1: Asymmetric shock and monetary policy of the ECB

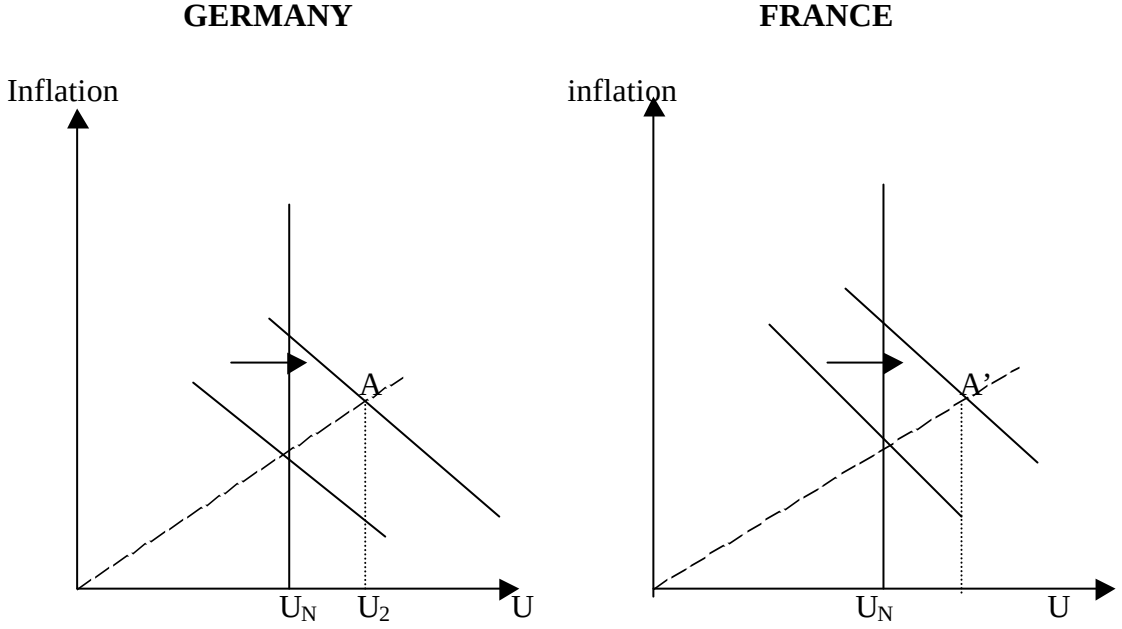


The symmetric case is shown in figure 2. We now assume that the shock is exactly the same in both countries, i.e. the short-term Phillips curve shifts upwards in both France and Germany. The ECB observes an increase in unemployment in Euroland as a whole. Given its desire to stabilise as expressed by the upward sloping optimal stabilisation line, it takes action and follows an expansionary monetary policy. We move to points A and A'. Although from the German point of view, the shock is the

[2] We assume here equal sized countries. Things are more complicated when countries are not of equal size. See De Grauwe, Dewachter and Aksoy(1999).

same, the ECB is now capable of stimulating the economy in Germany and to reduce the increase in unemployment.

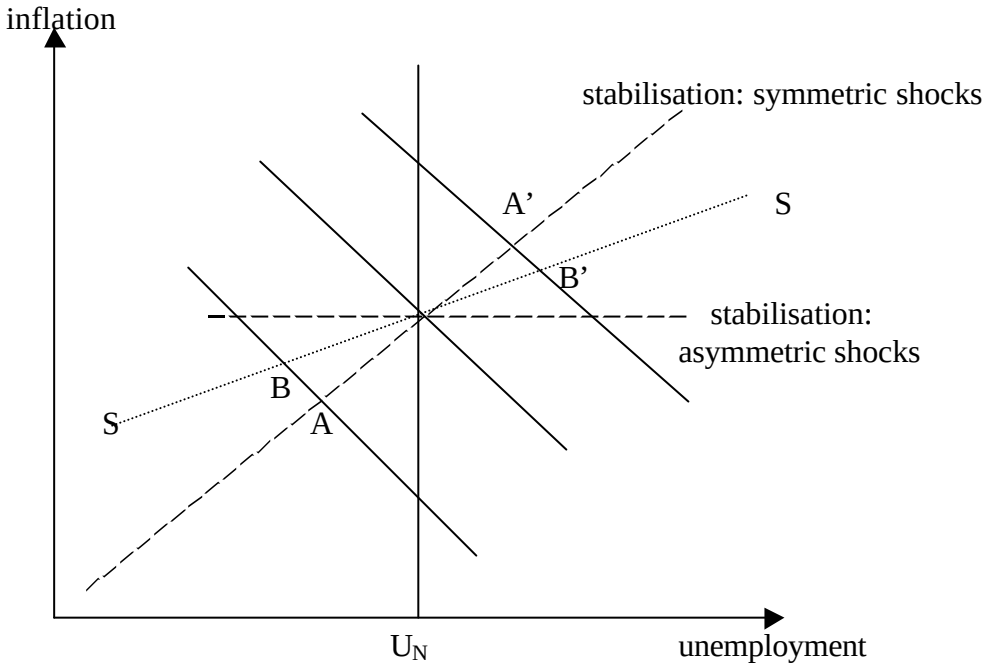
Figure 2 : Symmetric shock



Thus, the effectiveness of the ECB to stabilise output in individual countries depends on whether the shocks are symmetric or asymmetric. In practice, shocks will always be some mixture of symmetric and asymmetric movements. We can derive the following important conclusion. To the extent that there is some asymmetric component in the shocks, the ECB will always stabilise too little from the point of view of the individual member state. We illustrate this in figure 3, where we show an individual member state. We assume that the short-term Phillips curve moves up and down in an unpredictable way. When these shocks are purely asymmetric, the ECB does nothing so that unemployment varies along the horizontal dotted line. If these shocks in the Phillips curve are purely symmetric, the ECB will stabilise to the extent given by its optimal stabilisation line. Unemployment will then fluctuate between the points A and A'. We show the more likely intermediate case where the shock is a combination of symmetry and asymmetry. In this case the stabilisation will be given by the line SS which is intermediate between the pure asymmetry and symmetry cases. Unemployment now fluctuates between the points B and B'. Thus, there will

always be too little stabilisation from the point of view of the individual country. This may lead to conflicts between individual nations and the ECB.

Figure 3



Can this problem of insufficient stabilisation be resolved? The answer is negative. The analysis we have performed is just an extension of the theory of optimum currency areas. This says that if countries are subject to asymmetric shocks and if they lack sufficient flexibility, they will find it costly to be in a monetary union. The analysis of this paper gives practical content to this theory. Thus, if countries do form an optimum currency area (in the sense of not being subjected much to asymmetric shocks) the ECB will have a relatively easy time to stabilise shocks, and there will be few conflicts between member states and the ECB. Conversely, if countries do not form an optimum currency area the ECB will have a hard time to stabilise output and employment. There will also be a lot of conflict between member-states and the ECB

The sixty-four thousand-dollar questions are how important these asymmetric shocks will be in the future. This question has been hotly debated in the literature (see De Grauwe(1997) and Gros § Thygesen(1998)). Ultimately this is an empirical question. There is some empirical evidence (see e.g. Frankel and Rose(1998)) indicating that as Euroland integrates more an increasing amount of shocks are likely to be regional or

border overlapping. As a result, the problem the ECB will face may not be very different from the problem any central bank of a country (that is not too small) faces when regional shocks occur. Such a central bank is equally incapable of using its monetary policy to deal with a regional problem.

There are, of course, a number of provisos to be added here. First, nation-states are different from regions, and may react differently when they feel that the central bank is not capable of dealing with shocks that hit them more than other countries. Second, the fact that nation-states continue to exist creates the potential for shocks that have a political or social origin. The difficulty to deal with such a shock in a monetary union may lead politicians to look for a scapegoat in the ECB. Third, the existence of different nations with their own legal and cultural systems leads to different transmission mechanisms of the policies of the ECB, creating a different view about what exactly the ECB should do. We pursue this question of asymmetric transmission mechanisms in section 4.

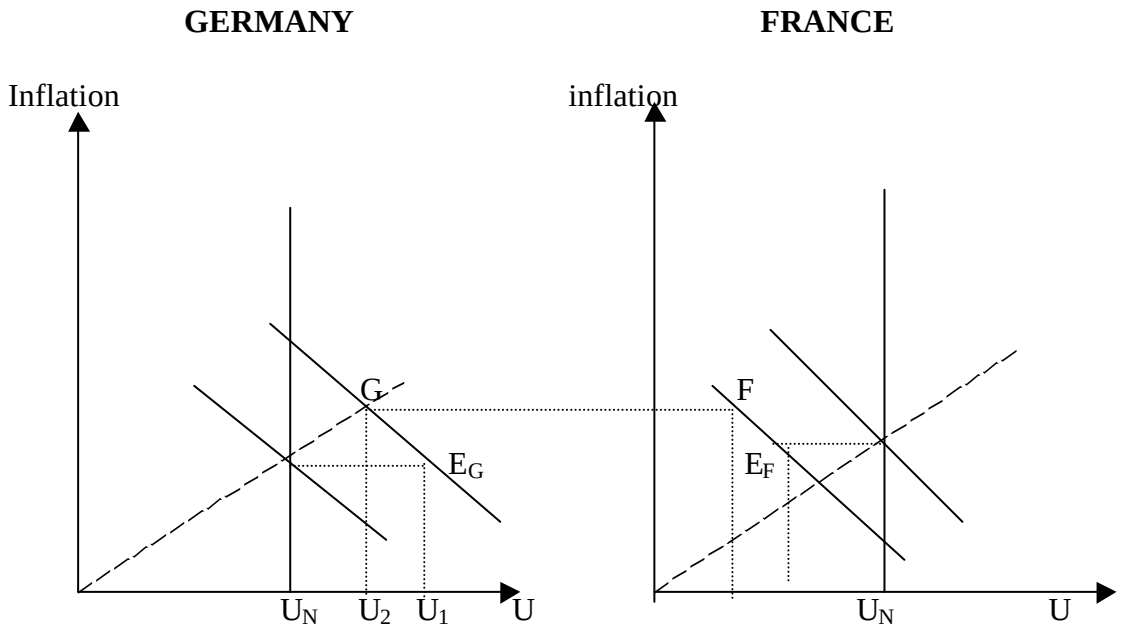
3. EMU versus EMS

The previous analysis revealed a problem of monetary stabilisation in a monetary union. One may argue that the way the problem was presented is unfair to EMU, because we compared EMU to an ideal situation in which each country can set monetary policies optimally. In practice, many countries (if not most) do select an optimal point on their stabilisation line because they fear that the exchange rate variations that are implicit in such policies, will introduce new sources of volatility and affect their trade negatively. As a result, many countries peg their exchange rate and abstain from using monetary policies as a stabilising tool. This was also the case within the EMS, which preceded EMU. During the EMS-period, most EU-countries pegged their exchange rate to the German mark, letting the Bundesbank decide about monetary policies. It may therefore be fairer to EMU to compare the latter regime with the EMS-regime. We do this in Fig. 4. We assume (as before) that Germany is the leader. It sets its monetary policy optimally based on the shocks that occur in Germany. France pegs its currency to the German mark and, therefore, has to accept whatever policy decision Germany takes.

In Fig. 4, we suppose as before a pure asymmetric shock. The short-term Phillips curve shifts upwards in Germany and downwards in France. Germany has the freedom to set its monetary policy optimally, and selects point G, i.e. it reacts to the increase in unemployment by expansionary monetary policies, which raise the inflation rate temporarily. Since France has pegged its currency to the German mark, it has to follow this expansionary policy. This brings the French economy to point F.

When we compare this outcome with EMU we find (not surprisingly) that Germany does worse in EMU than in the EMS. In the latter, it can stay on its optimal stabilisation line, while in the former it has to accept point E_G which implies less stabilisation of the unemployment shock. Exactly the opposite holds in France. EMU is definitely better from the point of view of stabilising shocks in unemployment. In EMU, the same unemployment shock is better stabilised (point E_F) than in the EMS (point F). Since in EMU there is no stabilisation at all (given our assumption of pure asymmetry in shocks), the EMS actually destabilises unemployment in France. That is, the EMS monetary regime reinforces the unemployment shock in France.

Figure 4: Asymmetric shocks and monetary policy in the EMS

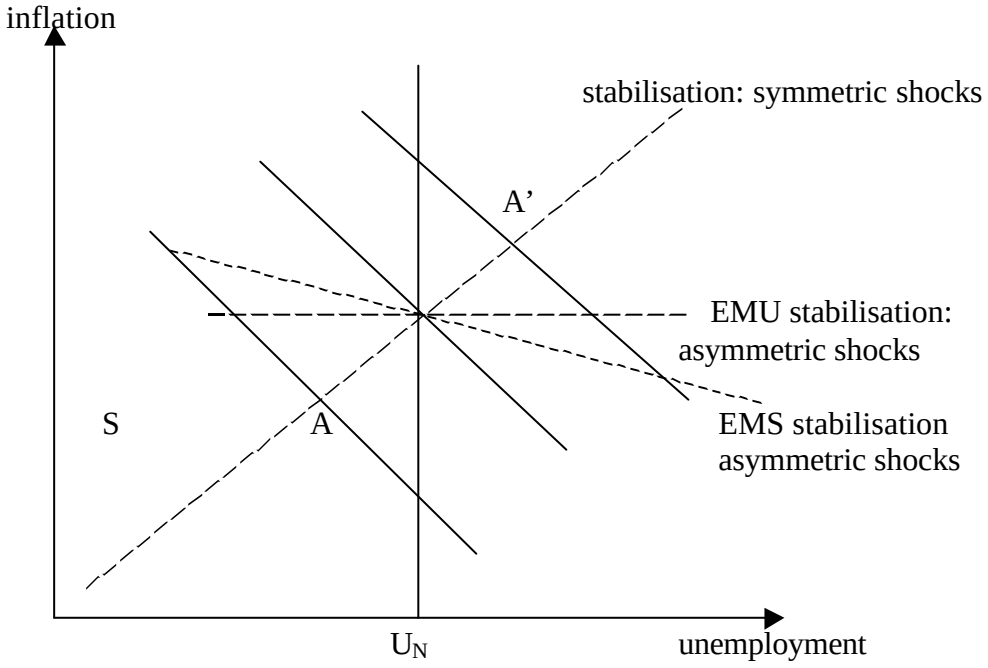


We can construct a “stabilisation” line of France under the EMS-regime (assuming that shocks are purely asymmetric) much in the same way as we derived stabilisation lines in Fig. 3. We show this in Fig. 5. Under EMU there is no stabilisation, so that

the economy moves along the horizontal line when the Phillips curve shifts up and down. Under the EMS regime these shocks in the Phillips curve are amplified, so that the economy moves along the negatively sloped "stabilisation" line. Thus, when shocks are asymmetric, the EMS destabilises unemployment. This feature is absent in EMU. We conclude that from the point of view of France EMU is welfare improving because it leads to a less inefficient stabilisation than the EMS.

Note that the more the shocks become symmetric the closer the stabilisation lines approach the upward sloping stabilisation line under symmetry. In the limit of pure symmetry the two regimes (EMU and EMS) have the same stabilisation properties.

Figure 5: Stabilisation under EMU and EMS when shocks are asymmetric.



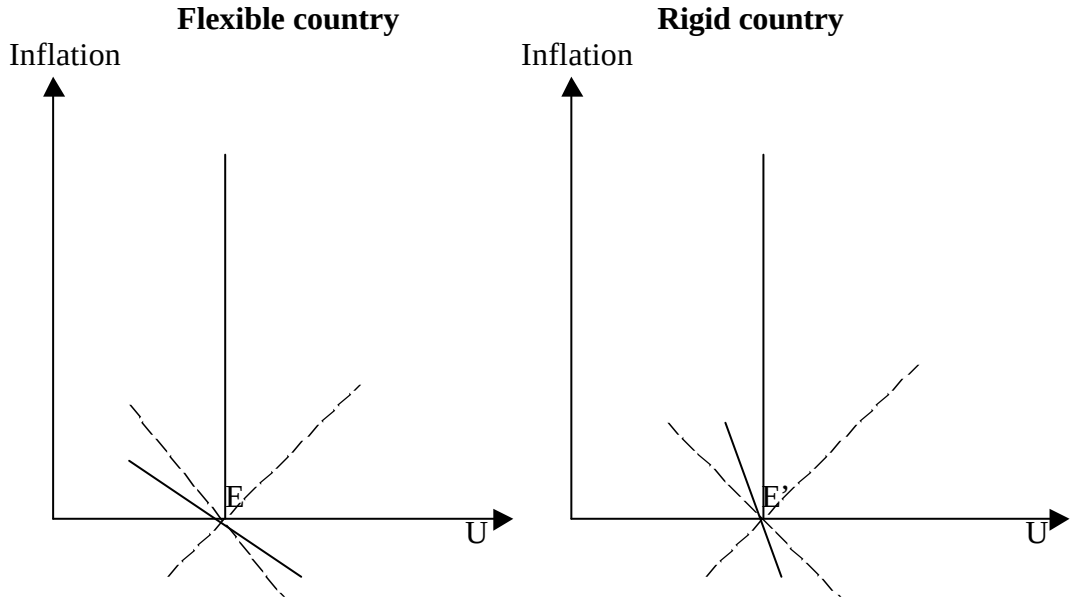
4. Asymmetries in the transmission and optimal monetary policies

In the preceding sections we analysed how asymmetric shocks affect the monetary policies of the ECB. In this section we take a different perspective. We study symmetric shocks but stress that these can be transmitted in an asymmetric way because economies can have different structures and institutions. Recently, exciting new research has been undertaken analysing these differences in institutions within

Euroland[3]. These asymmetric transmission processes arise because institutions in labour markets, in products markets and in financial markets differ. Quite often these differences have a deeper cause that relate to culture, social and legal systems.

In this section we focus on just one such institutional asymmetry, i.e. the one that exists in the labour markets. We will assume that there are two countries that differ in the degree of rigidity in their labour markets. One country has a high degree of rigidity, the other has a low degree of rigidity in its labour market. We represent these two countries in figure 6. The "flexible" country is characterised by a relatively flat short-term Phillips curve, the "rigid" country by a relatively steep one. Put differently, due to rigidities in its labour markets, inflationary surprises have little effect on unemployment in the rigid country.

Figure 6



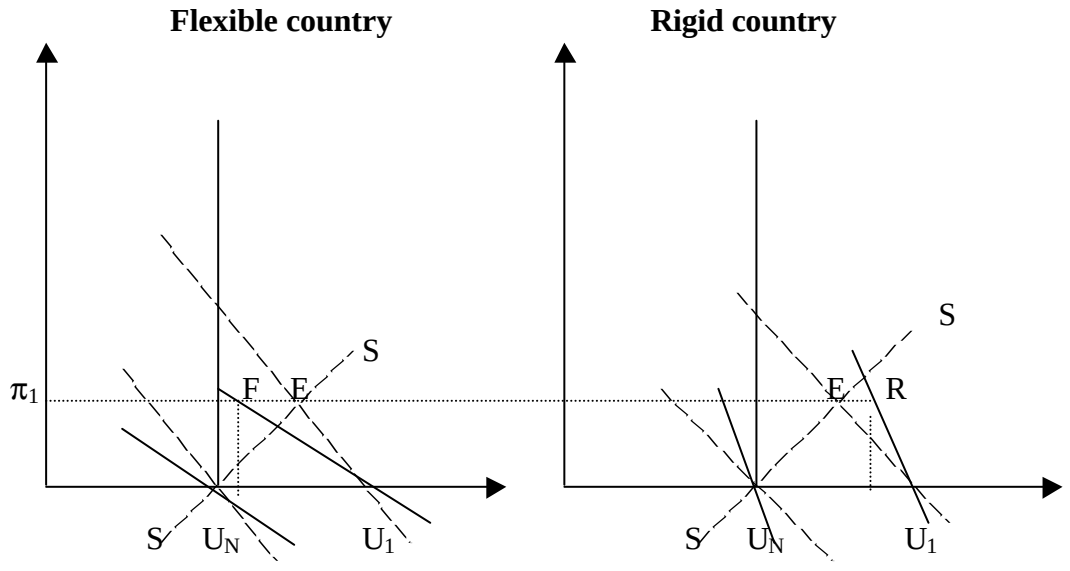
We now assume that the ECB estimates the euro-wide short-term Phillips curve. This produces an estimated Phillips curve whose slope is an average of the slopes of the Phillips curves of the individual countries. We represent this euro-Phillips curve by the downward sloping dotted lines. We also assume that the ECB is target conservative, i.e. that it does not target the unemployment rate below the natural unemployment rate. This ensures that the inflation bias disappears. The ECB now computes the optimal stabilisation path for Euroland as a whole based on its estimate

[3] See Cecchetti(1999) and Maclennan, et al. (1999).

of the euro-Phillips curve. This yields the upward sloping optimal stabilisation line. In the absence of shocks equilibrium is obtained in E and E'.

Let us now analyse the effect of a symmetric shock. We assume this takes the form of an equal displacement of the short-term Phillips curves in the two countries. We present this shock in figure 7. In both countries the Phillips-curve shifts to the right by the same distance $U_N - U_1$. Since the shock is the same, the euro-Phillips curve shifts to the right by the same amount. The ECB now computes the optimal response to the shock and finds the point E, which is located at the intersection of the euro-Phillips curve and its optimal stabilisation path. Thus the optimal inflation rate for Euroland is π_1 The unemployment rates in the two countries is given by the points F and R. Not surprisingly, in the flexible country the stabilisation done by the ECB is quite effective in limiting the increase in unemployment. This is much less the case in the rigid country. There the stabilisation effort of the ECB does very little to reduce the impact of the shock in unemployment.

Figure 7



We conclude that, due to structural differences in the workings of the labour markets, the same policy of the ECB has very different effects on outcomes in different countries.

6. **The Monetary Policy Strategy of the ECB: A description**

The ECB has formulated the strategy it will follow to set monetary policies in Euroland. This strategy is about the definition of the ultimate targets (inflation, output) and the intermediate targets. As is well known, the ultimate targets are often affected very indirectly and with long lags. Therefore, central banks select intermediate targets that are known to influence the ultimate targets, and that can be influenced more directly by the central banks. We first describe the ECB-strategy. In the next sections we critically evaluate it.

The first step in the formulation of the Monetary Policy Strategy (MPS) consists in giving a precise definition of price stability. The Governing Council of the ECB has adopted the following definition: "price stability shall be defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%" (ECB Monthly Bulletin, January 1999, p. 46). The ECB adds that for all practical purposes this phrasing implies a target range of inflation of 0 to 2%. Price stability according to this definition "is to be maintained over the medium run". This means, for example, that if inflation suddenly increases above the target range due to a large disturbance, the ECB will allow for a gradual adjustment back to the target range. The ECB, however, does not define what the "medium run" is.

Having identified the target of monetary policies the ECB then describes the strategy to achieve it. A "two-pillar" approach is proposed. The first pillar is the monetary one. Since inflation is ultimately a monetary phenomenon, money should be given a prominent role in this strategy. In order to see this, it is useful to start from the quantity theory equation, which we can write (in log-linear form) as follows:

$$m + v = p + y \qquad (1)$$

where m is the log of the money stock, v is the log of the velocity of money, p is the log of the price level, and y is the log of real GDP.

We can also express this equation in first differences. This yields, after rearranging

$$\Delta m = \Delta p + \Delta y - \Delta v \qquad (2)$$

where Δ is the change from one year to the other. Since we take changes of logarithms these changes should be interpreted as percentage changes. Equation (2) can be

interpreted as the growth rate of the money stock that is consistent with a particular target of inflation, given the underlying growth rates of GDP and of velocity.

The first pillar of the ECB strategy can now be described as follows. The ECB makes a forecast of the future trend growth of real GDP (Δy). In its Monthly Report of January 1999 this was estimated to be approximately 2%. Next the ECB forecasts future velocity of money. In the same Monthly Report velocity was estimated to decline in a trend-wise fashion by approximately 0.5% per year. Thus $\Delta v = - 0.5\%$. With these two numbers fixed, the ECB finds the growth rate of the money stock that is consistent with the inflation target, which is at most 2%. As a result, the money stock should not be increasing by more than 4.5% per year[4]. This is then the target for the money stock growth. The ECB selected M3 as the relevant money stock definition.

This is the same procedure as the one followed by the Bundesbank in the past. The ECB, however, stresses that the 4.5% money stock number should not be considered as a target, but rather as a "reference value". This means that if the actual increase in M3 exceeds 4.5%, the ECB may (or may not) take action to reduce the growth rate of M3 (by raising short-term interest rates, for example). Thus, the deviation between the actual money growth and the target value will be interpreted flexibly by the ECB. Although the wording was different, this was also the attitude of the Bundesbank towards the use of the money growth target. The main difference between the use of the money stock as a reference value by the ECB and as a target by the Bundesbank is the fact that the latter defined a corridor between which the money stock was steered whereas the ECB uses a point value. In this sense it can be said that the Bundesbank commitment to its money stock target was higher than the ECB's commitment to the reference value. Whether in practice this difference amounts to much is unclear. The Bundesbank is known to have let the money stock wander outside the corridor 50% of the time.

The second pillar in the Monetary Policy Strategy remains very vague. The ECB will use a wide range of indicators of future price developments. "These variables include, *inter alia*, wages, the exchange rate, bond prices and the yield curve, various measures of real activity, fiscal policy indicators, price and cost indices and business

and consumer surveys" (ECB, Monthly Report, January 1999, p.49). Thus, if for example wages increase a lot in Euroland, the ECB may deem this to threaten future price stability and may therefore take appropriate action (in this case increase the short-term interest rate, and/or reduce liquidity in the system). Again the ECB has preferred not to tie itself down. The list of potential indicators is open-ended. Others may be added, and those on the list may or may not receive much attention.

In a nutshell, the Monetary Policy Strategy of the ECB sets an inflation target of 2% at most. In order to steer actual inflation towards that target, the ECB watches a number of variables that influence future inflation. The most prominent of these variables (the intermediate targets) is the growth rate of M3. In the next section we evaluate this monetary policy strategy.

7. The Monetary Policy Strategy of the ECB: An evaluation

The Monetary Policy Strategy (MPS) of the ECB can be criticised on several grounds. We will concentrate here on the selection of the ultimate target, on the privileged use of the money stock as an intermediate target, and on alternative strategies.

7.1 The selection of the target

In its written documents the ECB recognises only one target of monetary policy. In the January Monthly Bulletin where the MPS is described in detail there is no reference to any other objective other than price stability. This goes counter to the Treaty, which mandates that the ECB should also pursue other targets, if these do not interfere with price stability. Thus, the ECB has been capable of redefining the contract it has with the rest of society by substantially narrowing its responsibilities. In effect it is claiming that it can only be made accountable for maintaining price stability. The Treaty, however, had defined these responsibilities to be broader although, as is well-known, considers price stability to be the *primary* objective. The ECB seems to have interpreted to mean *sole* objective. This state of affairs is quite surprising and will surely lead to problems in the future.

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[4] This number could change in the future if the ECB deems that the trend growth of GDP and/or of velocity changes.

It is useful to point out here that the exclusive targeting of inflation does not necessarily mean that other objectives cannot be realised at the same time. In particular inflation targeting also leads to output stabilisation when the source of the shock comes from the demand side (see Bofinger(1999) and Clarida, et al. (1999) on this issue). This is illustrated in Fig. 10.

The left panel shows an economy experiencing a boom, which is the result of a high level of aggregate demand (represented by the dotted AD-line). As a result, output exceeds full capacity level (the normal level). To prevent inflationary pressures the ECB will follow restrictive monetary policies (shown by the arrow, which shifts the AD-line back to its normal level). This has the effect of stabilising both the price level and the output level. There is no trade-off between price and output stabilisation when shocks in aggregate demand occur.

Things are very different when shocks originate in the supply side of the economy. We show this in the right panel of Fig. 10. The economy has experienced a negative supply shock, which lowers output but increases prices. When the ECB targets the price level, it will tend to reduce aggregate demand thereby lowering the price level again at the expense of an even lower output level. In this case there is a trade-off between inflation and output stabilisation. (This was also the underlying assumption when we discussed the optimal stabilisation in the context of the Barro-Gordon model). In its official pronouncements, the ECB has made it clear that when there is such a trade-off, it will always pursue price stabilisation.

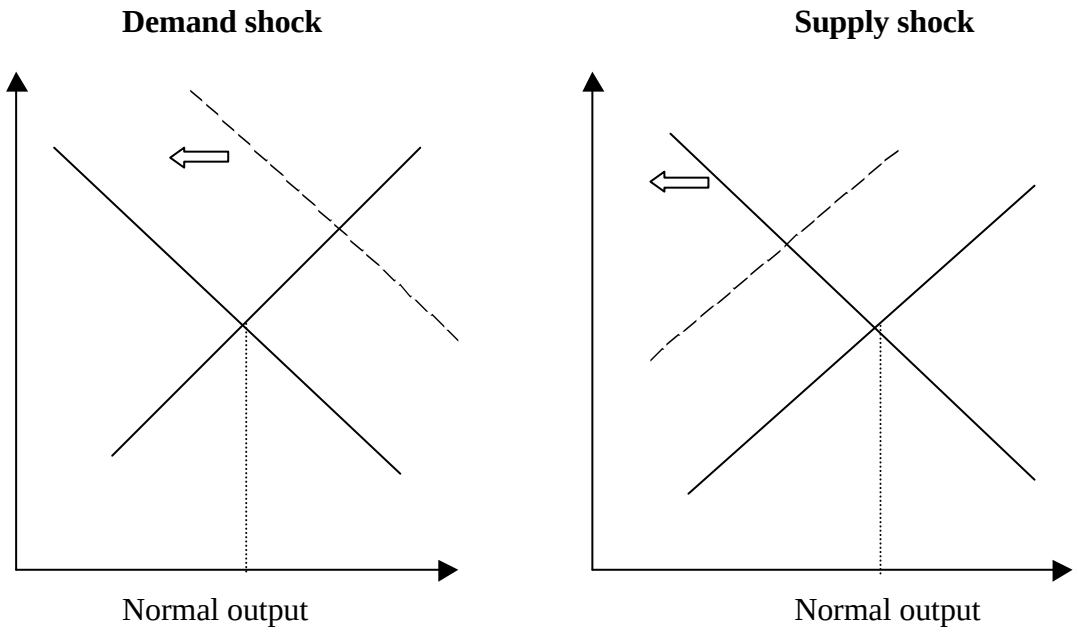
Fortunately, the ECB has left the door open for some output stabilisation even in this case of a supply shock. As mentioned earlier, the ECB defines price stability over the "medium run". Thus, if after a supply shock, prices start to rise, the ECB may apply gradualism in its response. This means that it would not immediately react by restrictive monetary policies aiming at stopping the price increases immediately. Instead it would try to gradually lower the inflationary pressures. In doing so, it would avoid the sharp decline in output.

It should be mentioned that proponents of inflation targeting (e.g. Svensson(1997)) have stressed that the *gradual* transition to the inflation target after a shock is the right approach and allows a central bank to also care about output stabilisation. The future

actions of the ECB will make clear whether the ECB is willing to follow this gradualist approach to inflation targeting.

The decision to lower the interest rate in April 1999 suggests that the ECB is taking into account other objectives than price stability. In particular the decline in the growth rates of output observed at that time may have influenced the ECB to relax its monetary policy stance. Thus, there may be a difference between the official ECB-pronouncements and it policy actions, whereby the former are tougher than the latter. This may be part of a strategy to achieve credibility. In the long run it will be important, however, to make words and actions consistent in order to maintain credibility.

Figure 10



7.2 Is the inflation target of at most 2% too low?

In the 1950s Milton Friedman formulated the view that the optimal inflation rate is zero. The basic reason for this conclusion is that a zero inflation rate maximises the total utility of holding money. Two other factors, that recently have been much researched, cast doubts on this conclusion.

First, there is evidence that because of rapid technological change the conventional measures of inflation (the rate of change of the consumption price index) tend to overestimate the true inflation rate by 1 to 2 % a year (see Gordon (1996), and Shapiro and Wilcox(1996)). The reason is that the conventional measures of inflation do not take into account quality improvements[5]. As an example, take a personal computer in 1999 and compare it to one in 1980. Their price may be approximately the same. However, the computing power of the 1999 version is probably 1000 times greater, if not more. As a result, the price per unit of computing power in 1999 dropped to a very small fraction of what it was in 1980. Many similar examples can be given. We conclude that if we observe an inflation rate of 1 to 2%, the true underlying inflation rate is probably zero.

Second, there are theoretical arguments to be made for a rate of inflation a little higher than 0%. The main one is that sectoral or micro-economic shocks require adjustments in relative real wages. In particular, sometimes a sector or a firm is confronted by a negative shock necessitating a decline in the real wage level. If the rate of inflation is zero, such a decline in the real wage can only come about by a decline in the nominal wage rate. If, however, inflation is positive one can achieve a decline in the real wage by keeping the nominal wage increases below the rate of inflation. There is a lot of evidence that the resistance against nominal wage reductions is high, thereby limiting real wage adjustments when the rate of inflation is zero. Put differently, in a environment of zero inflation, there is likely to be more real wage rigidity making adjustments to asymmetric sectoral shocks more difficult to achieve. In a recent article Ackerlof, et al., (1996) come to the conclusion that this effect may require the monetary authorities to target an inflation rate close to 2% per year.

The previous analysis then leads to the conclusion that the optimal inflation rate may be of the order of 3 to 4% per year (1 to 2% on account of the measurement bias, and 2% on account of the real wage effect).

The ECB has recognised the quality bias problem, although it claims that it is less important in Euroland than in the US. Thus, implicitly the ECB considers the lower bound of the inflation target range to be a larger than zero. It has not been willing to

[5] There are other reasons too. For example, when the price of a particular commodity increases, consumers will substitute that commodity with a cheaper one. Measurements of inflation typically disregard these substitution effects.

put an exact number for this lower bound, except that it may be of the order of 0.5%. If this is confirmed this would argue for a redefinition of the target range to fall between 0.5% and 2.5%. Surprisingly, the ECB seems to be willing to accept that the quality bias increases the lower bound of the target range, but not the upper bound. The ECB has made it clear that it does not buy the real wage flexibility argument.

All this leads to the conclusion that the ECB may have set its inflation target too low for the good of Euroland's economy.

There are many other aspects about inflation that may lead to qualify this conclusion. One is that inflation tends to distort savings decisions. In particular, taxes are usually based on nominal quantities. As a result a tax on interest rates will have a larger real impact when inflation is high than when it is low. This will tend to lower savings. The existence of inflation, however, tends to reduce the tax burden of firms. The reason is that firms can subtract the interest costs of their debt. This will be larger when inflation is high. All this complicates the question of how high the optimal inflation rate is.

7.3 Excessive reliance on the money stock?

The ECB has singled out the money stock (M3) as a privileged indicator for steering its monetary policy actions. This approach has come under increasing criticism. Most central banks that used it at some point (the Federal Reserve and the Bank of England in the 1980s) have dropped it. The Bundesbank was the only major central bank that used it until 1999 (when it lost its sovereignty). However, there is strong evidence that it was not very successful in its money stock targeting. Half of the time the actual money stock numbers fell outside the targeted range [6]

The reasons why central banks were not successful in using the money stock as an intermediate target are the following. First, the concept of money stock is very elusive. Should one use M1, M2, or a broader concept of money stock? The ECB has selected a broad concept of M3. Financial innovations can, however, affect these numbers in ways that have nothing to do with signals of future inflation.

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[6] See Bernanke, B., and Mihov, (1997), and Clarida and Gertler (1996). This has led these authors to conclude that the strong reputation of the Bundesbank had nothing to do with

Second, and more importantly, as equation (2) makes clear, the precision with which targeting the money stock will bring us close to the ultimate inflation target depends on the precision with which output growth and velocity growth can be forecast. Major problems have arisen with forecasting velocity growth. This is due to the fast speed of financial innovation, which has led to unpredictable behaviour of velocity[7].

The result of all this is that most central banks that attempted to apply money supply targeting, have been quite unsuccessful, and have missed their announced targets most often, and by wide margins. It also means that the money stock numbers give too many wrong signals about the future course of inflation to be useful as an intermediate target. Whether one calls the money stock the "reference value" (as the ECB does) or an intermediate target does not change the essence of this criticism. M3 will be pretty much useless as a reference value much of the time.

The ECB seems to have understood this criticism. In the first half of 1999 the growth rate of M3 has consistently been above its reference value of 4.5% and yet the ECB did not act on this signal. It must be that it judged that M3 was giving wrong signals.

One can understand that the ECB, concerned as it was of building up its reputation, decided to copy the Bundesbank behaviour as closely as possible. This included copying the Bundesbank in its (unsuccessful) attempt at monetary targeting. It is likely that, once the ECB has grown up, it will decide to drop this relic of the past. This means that it will use the money stock as one of the many indicators of future inflation without giving it the privileged position it has now.

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money targeting (which the Bundesbank failed to apply successfully). It had everything to do with its success at keeping inflation low.

[7] There is a large literature on the question of whether the European money demand equation is more predictable than the national money demand equations (see Monticelli(1996)). The evidence indicates that in the past the European money demand was more stable than the national money demand functions. It has been stressed by Arnold and de Vries(1997) that this is due to the fact that the uncorrelated error terms of the national money demand functions tend to offset each other in the aggregation process towards a European money demand function.

7.4 Inflation targeting: A model for the ECB?

Recently, several central banks in the industrialised world (Bank of Canada, Bank of England, Bank of Sweden) have shifted towards inflation targeting. The academic enthusiasm for this strategy has been quite strong[8].

With inflation targeting is meant here a strategy whereby the central bank not only chooses inflation as its ultimate target (which the ECB is doing), but also uses its inflation forecasts as the intermediate target. It will then typically also announce this inflation forecast. Practically this means that if the ECB would apply this strategy it would collect information on all the variables (including the money stock) it thinks matter to influence future inflation. This would lead the ECB to arrive at a forecast of the future inflation rate. If this (unconditional) forecast exceeds the target level of inflation (2%), this would be a signal for the ECB to tighten monetary policy, and vice versa. Thus, inflation targeting is similar to money stock targeting. Both strategies have as their ultimate target the rate of inflation. Their choice of the intermediate target, however is different. In the money stock targeting the money stock is used as an intermediate target, in the inflation targeting it is the current forecast of inflation that plays the role of intermediate target. We represent this in Table 1. (We assume that in both cases the central bank uses the interest rate as its operational instrument).

It has been claimed by the proponents of inflation targeting that this is superior to money stock targeting (see Svensson(1998)). The reason is that in the inflation targeting strategy the central bank uses information of all the variables (including the money stock) that will affect future inflation. The forecasted inflation is then the best possible intermediate target. This contrasts with money stock targeting that omits a lot of information and, in addition, uses irrelevant information also (because as we argued earlier, the money stock today can change for reasons that have nothing to do with inflation). In this sense inflation targeting is superior to money stock targeting because it uses all relevant information to steer the inflation rate to its target level.

If the current experiments with inflation targeting in a number of central banks turn out to be successful, it is likely that an increasing number of central banks will want to use it, including the ECB.

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[8] For an evaluation, see Bernanke, et al. (1999).

Table 1:

	Instrument	*Intermediate target*	*Ultimate target*
MS-targeting	interest rate ⟹	money stock ⟹	inflation
Inflation targeting	interest rate ⟹	inflation forecast ⟹	inflation

Conclusion

In this article we have analysed issues relating to monetary policies in Euroland. There is no doubt that up to this day the policy record of the ECB has been reasonably successful. Nevertheless, challenges for the future abound. In this article we have stressed these challenges. A first one has to do with the difficulties of setting monetary policies in an environment in which asymmetric shocks occur and in which the transmission mechanisms differ between countries. We have argued that these asymmetries could paralyse the ECB in the future. In addition, we have also concluded from this analysis that the ECB should attach a greater importance to information about national economic conditions.

A second challenge arises concerning the formulation of the Monetary Policy Strategy. This strategy was announced as the official one that would guide future policy actions. As it stands today, this strategy contains too many flaws. It is too vague, and thereby can generate a lot of uncertainty about the ECB's policy intentions. It also attaches too much importance to the targeting of the money stock. There is a general consensus today among economists that the money stock is too noisy an indicator to warrant the special treatment the ECB is giving. Most probably the ECB agrees with this view since it has not been willing to use the signal this indicator was giving during 1999. It is advisable that the ECB stops pretending it is giving a special importance to the money stock. The Monetary Policy Strategy does

not describe well what the ECB is doing in practice. In order to maintain its credibility it is advisable that the ECB preaches what it does.

Finally we have also argued that the ECB sets its inflation target to low for the good of Euroland's economy. In the defence of the ECB it must be said that its intention is to move to the inflation target in a gradual way, thereby allowing to take into account other objectives of monetary policies. The future will tell what exactly this gradualism à la ECB implies.

APPENDIX: The optimal stabilisation path in the Barro-Gordon model

In this appendix we derive the optimal stabilisation path used in our analysis of the Barro-Gordon model in this chapter. We start out by specifying the loss function of the central bank as follows:

$$L = (\pi - \pi^*)^2 + b(u - u^*)^2 \qquad (1)$$

where L is the loss of the central bank. This is a function of the difference between observed (π) and target inflation (π^*), and of the difference between observed (u) and target (u^*) unemployment; b is the weight attached by the central bank to stabilising the unemployment around the target. We will assume that target inflation is zero ($\pi^*=0$). Target unemployment is assumed to be determined by the following expression

$$u^* = \lambda\, u_N$$

where u_N is the natural unemployment rate. We assume that $\lambda < 1$, i.e. the central bank targets an unemployment rate below the natural rate. The usual rationale for this assumption is that distortions in the labour market keep the natural unemployment rate too high. The first best solution would be to remove these distortions. If this first best policy cannot be achieved, the second best policy consists in targeting the unemployment rate below its natural level.

The short term Phillips curve is specified as follows:

$$u = u_N - a(\pi - \pi^e) + \varepsilon \qquad (2)$$

where π^e is expected inflation, and ε is a stochastic disturbance in output. This Phillips curve equation captures the standard assumption that only inflation surprises can affect unemployment. More precisely, an unexpected increase in inflation lowers unemployment relative to its natural level. The parameter a is the elasticity of unemployment with respect to inflation surprises.

The central bank now minimises its loss function with respect to inflation, given the inflation expectations of agents. We use the conventional assumption that the central bank directly controls inflation. We could alternatively add an equation linking inflation to some policy instrument such as the money stock (see Walsh(1998)). Substituting (2) into (1) yields:

$$L = \pi^2 + b[a(\pi^e - \pi) + (1 - \lambda)\, u_N + \varepsilon]^2 \qquad (3)$$

Taking the derivative of L with respect to π, and solving for π yields the optimal inflation rate for a given expected inflation:

$$\pi = \frac{a^2 b}{1 + a^2 b}\pi^e + \frac{ab(1 - \lambda)}{1 + a^2 b}\, u_N + \frac{ab}{1 + a^2 b}\varepsilon \qquad (4)$$

In a rational expectations world agents know this optimal rule that the authorities use. They will therefore incorporate this rule in their expectations formation. Thus they set their expectations accordingly, i.e.

$$\pi^e = \frac{a^2 b}{1 + a^2 b}\pi^e + \frac{ab(1 - \lambda)}{1 + a^2 b}\, u_N \qquad (5)$$

Note that the expected value of ε is zero. This is why the last term in (4) drops out when we take expectations. We can now solve for π^e. This yields

$$\pi^e = ab(1 - \lambda)\, u_N \qquad (6)$$

We obtain the well-known result of the Barro-Gordon model: in equilibrium the average inflation is positive reflecting an inflation bias. This inflation bias increases with a, b and u_N.

Given that there are shocks in the Phillips curve the observed inflation will deviate from this average inflation, reflecting the fact that the central bank sets the inflation rate so as to reduce the variance of unemployment. Thus

$$\pi = \pi^e + \frac{ab}{1 + a^2 b}\, \varepsilon \qquad (7)$$

or

$$\pi = ab(1 - \lambda)\, u_N + \frac{ab}{1 + a^2 b}\, \varepsilon \qquad (8)$$

We can now substitute (8) into the Phillips curve. This yields the solution for u:

$$u = u_N + \frac{1}{1 + a^2 b}\varepsilon \qquad (9)$$

Equation (9) says that on average $u = u_N$, i.e. the authorities cannot systematically have an unemployment rate below the natural level. The unemployment rate will deviate from this average when there are shocks in the Phillips curve. Consider a positive shock, $\varepsilon > 0$. In this case the effect of the shock on unemployment will be influenced by b, i.e. the stabilisation parameter in the loss function of the authorities. The larger is this b, the weaker is the effect of a given shock on unemployment. Note that a high b also produces a high inflation bias. The latter is the price the authorities pay for their stabilisation efforts.

We can now derive the optimal stabilisation path as follows. Take the derivative of π with respect to ε, and the derivative of u with respect to ε. This yields

$$\frac{d\pi}{d\varepsilon} = \frac{ab}{1 + a^2 b} \qquad (10)$$

$$\frac{du}{d\varepsilon} = \frac{1}{1 + a^2 b} \qquad (11)$$

Equation (10) tells us how the central bank optimally sets the inflation rate in response to shocks. Equation (11) says how this optimal response to shocks affects the unemployment rate. Taking the ratio of these two expressions yields the slope of the optimal stabilisation line, i.e

$$d\pi/du = ab$$

Thus, the optimal stabilisation line becomes steeper when the parameters a and b increase.

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