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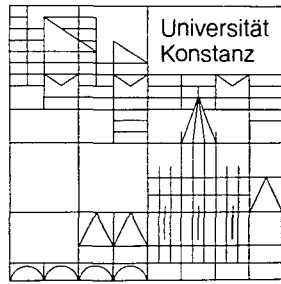
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**The Inefficiency
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THE INEFFICIENCY OF THE D-MARK STANDARD

Nikolaus K. A. Läufer

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The inefficiency of the D-Mark standard

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Abstract

The present monetary strategy within the DM-standard is shown to be inefficient and an improvement of the current strategy is proposed.

1 Introduction

The present discussion of the monetary future of Europe focusses mainly on institutions. The discussion is hardly concerned with future policy. To some extent this situation is justified by the desire to erect a Europe with one money. However, as soon as we shall have a Europe with one money we will also need a monetary policy for it. To be prepared for that day we should discuss future monetary policy now.

In the present discussion of a future monetary order for Europe we are also frequently invited to believe that present conditions can only be improved by introducing new monetary institutions in Europe. According to this view short of new institutions, in particular without a European central bank, no improvements in the present European monetary system can be made.

By the word DM-standard I refer to the fact that the D-Mark has become the key currency both within the EMS and for some other countries like Austria and Switzerland who are not yet members of the EMS.¹ Politicians outside Germany are dissatisfied with the Bundesbank dominance in the DM-standard. In Germany the present discussion of the monetary future in Europe is largely concerned with the possibility of losing the stability of the present D-Mark standard. Hardly anyone is doubting the efficiency of the present D-Mark standard.

¹The view that the EMS is a D-Mark area is supported by empirical evidence which is hard if not impossible to explain by assuming the opposite (see Giavazzi and Giovannini 1989).

On the side of economists the discretionists are dissatisfied with the Bundesbank strategy of monetary policy in the D-Mark standard. Targetting the money supply as done by the Bundesbank is regarded as not enough activist while rule-supporters are quite happy with the D-Mark standard and the Bundesbank targetting of the money supply.

In the following I shall try to show that the D-Mark standard is not efficient in the sense that stability could be higher than currently realized. This improvement requires no new institutions but only a change in the present strategy of existing institutions of monetary policy.

In order to avoid misunderstandings I should perhaps say that I am not a discretionist but count myself to the camp of rule-supporters. Nevertheless, I shall criticize the D-Mark standard and the current policy of the Bundesbank within that standard by claiming that the monetary policy strategy followed within the D-Mark standard is inefficient. I shall propose an improvement of the current strategy. The strategy proposed will be equivalent to the efficient targetting strategy of a future European central bank. However, this strategy can also be executed without a European central bank. It can be realized by central bank cooperation within the present system of national central banks. Thus, the strategy proposed is a recommendable strategy for the second, the third and the final stage of the Delors plan. But it can also be viewed as an improvement of the strategies in the present system without reference to the stages of the Delors plan. In short, it is an improvement of monetary policy in the present system of central banks and an improvement that cannot be outperformed by the creation of additional institutions like a European central bank.

2 Basic assumptions

Let me specify some assumptions which I shall use in my theoretical argument without ever again referring to them:

1. Capital mobility is perfect within Europe;
2. exchange rates are fixed.

Due to these assumptions it is irrelevant for monetary stabilization policy in Europe in which country an amount of money to be supplied actually is supplied. Money demand is searching for the money stock and finding it wherever that stock may be in the net of countries tied together due to the assumptions made.

3 The task of monetary policy

I proceed from the assumption that the task of monetary policy is to minimize surprises coming from monetary shocks. A more precise definition of the task of monetary policy is to say that it should minimize the variance (around zero) of monetary surprises. This is the principle underlying the strategy of targetting the money supply.

Monetary surprises are differences (disequilibria) between money demand and money supply coming from shocks on either the demand or the supply side of money. Such disequilibria will require and cause adjustments in the determinants of money demand and money supply. Thus, these equilibria are the monetary causes of instabilities in interest rates, exchange rates, price level and output. Avoiding such disequilibria amounts to stabilizing the price level, exchange rates, interest rates and output. Therefore, minimizing monetary surprises as a goal of monetary policy is a much more comprising goal than, e.g., just stabilizing prices. And above all, it is consistent with a legal order which requires the central bank to secure the interior value of the currency ("Sicherung der Währung nach innen").

The philosophy behind the goal of minimizing monetary surprises is the idea that monetary policy when acting in an unforeseen manner in general will produce shocks or monetary surprises and thus will either cause or reinforce monetary disequilibria and therefore only aggravate stability problems rather than solving them. However, it is conceivable that monetary policy has superior and special knowledge (private information) on the timing, size and direction of particular monetary shocks. To the extent that this is the case monetary policy may have a valid reason for deviating from a preannounced path of money supply in order to compensate and neutralize the particular shock.² Yet, the case of private information does not invalidate or contradict the basic strategy of targetting the money supply. Private information is just a valid condition for an acceptable deviation from the target.

Clearly, deviations from a money supply target should not result in an accommodating monetary policy that the private sector may anticipate. The case for or against targetting the money supply depends on the relative significance

²It has been argued by Barro (1976) that in such circumstances monetary policy might obtain equivalent effects by just making its special information publicly available. However, the conditions under which this equivalence holds are very hard to find in the real world: perfect flexibility of prices and continuous recontracting.

of the exceptional events just described (private information) and of the risk for monetary policy of becoming accomodating by deviating from a preannounced money supply target. The fact alone that there exist valid cases for deviations of monetary policy from its preannounced path does not render meaningless a basic strategy of targetting the money supply.

Yet, the present paper need not be read as a justification of the monetary policy of targetting the money supply. Instead, it may be read as an attempt of discovering an improvement in the policy of targetting national money supplies. A possible improvement is found by introducing a European (EMS) international perspective.

Monetary shocks can come from the side of money demand as well as from the side of money supply. In order to simplify my exposition I shall only take into account money demand shocks. This is not a critical limitation of my analysis.

In the next step I shall describe the policy of a European central bank targetting the European money supply. This policy is the best policy available in the sense that it will minimize the variance of monetary surprises for the whole of Europe. I shall present this policy by reference to a European central bank. However, I want to emphasize already now that this policy can be realized within the currently available system of national central banks without a European central bank. All that is required is a certain cooperation among the national central banks. This cooperation may take place within the set of currently available institutions. A European central bank is not required.

4 Money supply targetting by a European central bank

4.1 European money demand function

The European money demand function may be specified by the following equation

$$M^d = E(M^d | I)(1 + \epsilon), \quad (1)$$

where M^d, I and ϵ are, respectively money demand, the information available and used in forming expectations and a multiplicative error term.

4.2 The loss function of a European central bank and its minimum

A European central bank, *EC*, targetting the European money supply is assumed to minimize the variance of monetary surprises. Neglecting money supply shocks monetary surprises may be defined as the deviation between the actual European money demand, M^d , and the target value for the money supply, M^a , announced by the European central bank:

$$S_{EC} = M^d - M^a. \quad (2)$$

The variance of the monetary surprises around zero is equal to:

$$E(S_{EC})^2. \quad (3)$$

This is the loss function of a European central bank.

The policy of targetting the money supply includes two decisions. One decision relates to the level or path of the money supply, the other relates to deviations from the path. Minimizing the variance of monetary surprises is a policy that minimizes the variance of impulses that are likely to push the money stock and therefore, possibly with a considerable lag, the price level from a desired level or path. Obviously, the second decision is well taken care of by our loss function, while that function seems not to include the first decision. We want to emphasize that also the first decision is taken care of by our loss function.

The first decision includes a decision on the target level of prices, interest rates and GNP and other endogenous (=potentially money supply dependent) variables in the money demand function. This first decision really is not excluded by our modelling of the decision problem of the central bank, because a policy decision on the price level etc. may be included in the information sets $I(I_i)$ which conditions the loss function and therefore also the solution of the optimizing problem of the central bank. In particular, the money demand function used in the loss function should be seen as a money demand with the price level, interest rate and GNP set at their target levels (a normative money demand function). In order to simplify our exposition and in order to emphasize our main point we shall assume that the current actual level of prices, interest rates and GNP are equal to the target rates and that monetary authorities (national and European unanimously) do not see any need of adjustment. Thus, by assumption, the economies are already on the desired path and would remain on it if there were no stochastic shocks from the side of money demand or money supply.

For the following it is important to note that the target money demand (normative money demand function) as just described does not depend on the target money supply. Instead the target money demand is predetermined and used to determine the target money supply. The optimal solutions for the money supply targets are derived using this independence property (independence assumption).

The optimal value for M^a is obtained by setting the partial derivative of the loss function with respect to M^a equal to zero:

$$\frac{\partial E [(M^d - M^a)^2 | I]}{\partial M^a} \quad (4)$$

$$= 2E \left[(M^d - M^a) \frac{\partial M^d - M^a}{\partial M^a} | I \right] \quad (5)$$

$$= 2E \left[(M^d - M^a) \frac{\partial M^d}{\partial M^a} - 1 | I \right] \quad (6)$$

$$= 0, \quad (7)$$

which gives

$$M^a = E(M^d | I). \quad (8)$$

The optimal value of the loss function is:

$$\text{Min } E (S_{EC}^2 | I) = [E(M^d | I)]^2 \text{var}(e). \quad (9)$$

This strategy of targetting the European money supply can be organized in the present system of national central banks by cooperation, a cooperation which can take various forms.³

In one form national central banks agree to apply a common European target growth rate to their past *national* money stocks in order to determine and compute the target level of the domestic component of their national money supplies. The *European* target growth rate would be computed on the basis of the European money demand function by means of the European loss function as just described. The *national* money demand as such would play no separate role. The role of national money demands would be limited to being part or component of the European money demand. In this form of cooperation the balance of payments would not be secured and arrangements would have to be made to allow for a permanent financing of the balance of payments deficits of the deficit countries

³Cooperation would require an agreement on common targets for price level (inflation), interest rates and output. It has been emphasized in the literature that this is not an easy process. See Russo and Tullio (1988).

by the surplus countries to the extent that these deficits are a consequence of the policy cooperation scheme and in line with it. A deficit would occur if the demand for money in a country were lower than the country's agreed upon contribution to the European money stock. This scheme of cooperation would also require nonsterilization of money (capital) inflows as long as these flows were not due to deviations from the agreed upon policy scheme.⁴

In an alternative scheme of cooperation both national and European money demand functions would be used. The target value for the domestic component of a country's money stock could be computed on the basis of national money demand. The national target values would have to be revised to make them consistent with a target value for Europe based on the independently estimated money demand function for Europe. In this scheme balance of payments disequilibria between the participating countries would be reduced to a minimum, provided the participating countries would stick to the agreement.

5 The policies under the D-Mark standard

5.1 Monetary policy of the Bundesbank

To simplify my exposition I shall assume that the EMS consists of only two countries. Country 1 is Germany, country 2 is the non-German part of EMS-europe. The present DM-standard is a system where the Bundesbank chooses and announces a money supply target, M_1^a , that minimizes the variance of monetary surprises defined by reference to the German money demand function. Monetary surprises taken into account by the Bundesbank are given by:

$$S_1 = M_1^d - M_1^a, \quad (10)$$

and the loss function of the Bundesbank is:

$$E(S_1^2 | I_1). \quad (11)$$

The minimum of this loss function under the independence assumption is obtained by setting the target value of the money supply equal to the expected value of the German money demand:

$$M_1^z = E(M_1^d | I_1). \quad (12)$$

⁴The necessity of nonsterilization in such a cooperation scheme has been convincingly advocated by McKinnon in various writings, e.g. (1977, 1979, 1984).

5.2 Monetary policy in country 2

The central bank of country 2 sets the target value of its money stock at such a level that the expected balance of payments is zero. With a zero balance of payments country two neither gains nor loses reserves. Thus, we suppose that country 2 has already enough reserves, it has enough DMs and does no longer try to accumulate those. The analysis can easily be modified to change this simplifying assumption without changing the essential results.

The loss function of country 2 is:

$$E \left[(R_2)^2 \mid I_2 \right], \quad (13)$$

where R_i is the balance of payments of country i . The minimum of this loss function is given by:

$$E(R_2 \mid I_2) = -E(R_1 \mid I_2) = 0. \quad (14)$$

Applying the monetary approach, the balance of payments may be defined by:

$$R_2 = M_2^d - M_2^a, \quad (15)$$

and its expected value is:

$$E(R_2 \mid I_2) = E(M_2^d \mid I_2) - M_2^a, \quad (16)$$

where M_2^a is the target value for the money supply in country 2. This definition of the balance of payments implies a target value for the money supply in country 2:

$$M_2^a = E(M_2^d \mid I_2), \quad (17)$$

which is symmetric to the target value chosen by the Bundesbank in country 1.

Given our assumption as to the satisfactory level of the reserves available in country 2, the central bank of country 2 will set the domestic component of its money supply at the following level⁵:

$$D_2 = M_2^z - F_{2,-1}. \quad (18)$$

⁵ $F_{2,-1}$ is the level of the foreign component of the money stock in country 2 at the end of the previous period.

5.3 The monetary surprises in the DM-standard

The monetary surprises for Europe can now be written as

$$S_{DM} = M_1^d + M_2^d \quad (19)$$

$$-M_1^z - M_2^z$$

$$= M_1^d + M_2^d \quad (20)$$

$$-E(M_1^d | I_1) - E(M_2^d | I_2)$$

$$= E(M^d | I)(1 + e) \quad (21)$$

$$-E(M_1^d | I_1) - E(M_2^d | I_2)$$

$$= E(M^d | I) [e + (1 - \rho)], \quad (22)$$

where

$$\rho = \frac{E(M_1^d | I_1) + E(M_2^d | I_2)}{E(M^d | I)}. \quad (23)$$

The monetary surprises in Europe under the DM-standard consist of two components. One component is due to the *stochasticity* of the European money demand function, the other component is due to targetting with an *inappropriate* money demand function, targetting with the national instead of the European money demand function.

5.4 The value of the European loss function under the D-Mark standard

We can now compute the value of the European Loss function under the Deutsch-Mark Standard. It is given by

$$\begin{aligned} & E(S_{DM}^2 | I \cup I_1 \cup I_2) \quad (24) \\ &= [E(M^d | I)]^2 [\text{var}(e) + (1 - \rho)^2] \\ &> [E(M^d | I)]^2 \text{var}(e) = E(S_{EC}^2 | I). \end{aligned}$$

In general we have:

$$\rho \neq 1, \quad (25)$$

from which the the inequality follows.

5.5 Interpretation

$E(S_{DM}^2 | I \cup I_1 \cup I_2)$, the expected value of the squared surprises of the DM-standard, is the value of the loss function associated with the DM-standard. The last term, $[E(M^d | I)]^2 var(e)$, represents the value of the loss function associated with a European central bank targetting the European money supply. The last term represents also the value of the European loss function for the cooperative scheme of European monetary policy as described before.

The *inequality* expresses the inefficiency of the DM-standard. The inefficiency may be identified by decomposing the monetary surprises. The *first component* is due to the *randomness* of the European money demand. It does not contribute to the inequality (inefficiency). The *second component* causes the inefficiency and is due to the use of the *national* money demand functions instead of the *European* money demand function in computing and setting national money supply targets.⁶

It is important to note that we do not explain the inefficiency by reference to a possible divergence in the national versus the European target levels of prices (inflation), interest rates and output.⁷

It may further be argued that a reasonable estimation procedure would make sure that $\rho = 1$. However, under the present arrangements within the D-Mark-Standard estimates of the national money demand functions are not constrained by the condition that the sum of their expected values equals the expected value of the European money demand function. An estimation procedure which made sure that $\rho = 1$ would be part of a form of cooperation in the sense of the term used in this paper.

It is indeed conceivable that the inefficiency of the D-Mark standard that we have identified may be eliminated by cooperation on the level of central bank

⁶We have tried to illustrate the quantitative significance of the inefficiency. Using annual data from 1973-1989 for Germany and France, restricting "Europe" to these two countries and estimating simple Marshallian demand functions both for these countries and for a Europe consisting of these two countries we found that within sample values of $\rho - 1$ may be as large as 0,015 (1,5 %). Such a figure, if positive, implies a monetary impulse equivalent to an extra 1,5 % of inflation. The mean of the absolute value of $\rho - 1$ was 0.56 % and different from zero with high statistical significance.

⁷To understand our point it may be convenient to imagine that the German national targets for inflation and nominal interest rates have been accepted as common targets in Europe and that the European target output is equal to the sum of the national target capacity outputs. Since our point is also independent of problems in estimating capacity output and in obtaining agreement on methods for obtaining such estimates we may neglect here their existence.

econometricians. However, given that the elimination of these inefficiencies has implications for seignorage gains accruing to the participating central banks it is unlikely that the issue would be treated merely as a technical matter.

6 Summary and conclusion

I have criticized the D-Mark standard and the current policy of the Bundesbank within that standard by showing that the monetary policy strategy followed within the D-Mark standard is inefficient. I have proposed an improvement of the current strategy. The strategy proposed is equivalent to the efficient targetting strategy of a future European central bank. However, this strategy can also be executed without a European central bank. It can be realized by central bank cooperation within the present system of national central banks. Thus, the strategy proposed is a possible and recommendable strategy for the second, the third and the final stage of the Delors plan. The strategy proposed can also be viewed as an improvement of the strategies in the present system of national central banks without reference to the stages of the Delors plan. In short, I have tried to show that there exists an improvement of monetary policy in the present system of national central banks, an improvement which cannot be outperformed by the creation of additional institutions like a European central bank.

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