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ON THE FEASIBILITY OF A ONE OR MULTI-SPEED EUROPEAN MONETARY UNION

Alberto Alesina

Vittorio Grilli

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ABSTRACT

This paper addresses two questions: (1) Is a twelve country monetary union in Europe feasible; (2) Can monetary union be achieved at multi-speed, i.e., with a first group of countries going first, and later admitting the others? After examining several politico-economic arguments concerning problems of feasibility of the union, we conclude with a fair amount of skepticism concerning the multi-speed idea. We show that the final result of the process of monetary integration is dependent upon at "how many speeds" Europe will proceed. Our discussion of feasibility shed some light on the political economy of the recent (Fall of 1992) turmoil in the monetary system of Europe.

Alberto Alesina
Department of Economics
Harvard University
Cambridge, MA 02138
and CEPR
and NBER

Vittorio Grilli
Birbeck College, University of London, CEPR
Department of Economics
7-15 Gresse Street
London W1P1PA
and NBER

1. Introduction

The recent turmoil in the European Monetary System, the Danish rejection of the Maastricht agreement and the close vote in France, have reproposed two key questions for the next decade of Europe: (1) Is a twelve country single currency area feasible? (2) Should European integration proceed with "multi speeds", i.e., should a group of countries go ahead first, and create a sub-single currency area waiting for the other countries "to straighten up their act"?

This paper addresses both questions. First we identify conditions which make a "one speed" Europe feasible and discuss what allocation of control over European monetary policy is consistent with it. One specific issue which we focus upon is "how to keep Germany in". In fact, one of the most commonly heard arguments about the benefits of European monetary integration is the gain in credibility of low inflation policies (i.e., Giavazzi and Giovannini (1989)). The question left open is, however, why should the lowest inflation, most credible country agree to help the others to gain credibility. In fact, we argue that the low inflation countries have a lot of bargaining power in the union: if the latter has to survive, the European Central Bank may have to be handed to the lowest inflation country.[1] This discussion of feasibility issues will also shed light on the current turmoil in European exchange markets and, in our view, provide the key for explaining them.

We then proceed to examining the issue of a "multi-speed" Europe and we conclude with a large amount of skepticism about this idea.[2] We consider a situation in which a "one speed", twelve country Europe, is feasible, that is, every country is better off with the union than without it. Suppose now that a group of, say, three countries go first and then decide, by

majority rule, whether to admit a fourth, fifth, sixth member, etc. It is perfectly possible, and, in fact, quite likely, that even for parameter values in which a "one speed" Europe is feasible, a "multi speed" Europe will stop at the first group of countries: the first three countries will never choose to admit the fourth. Therefore, by proceeding at "two speeds", one jeopardizes the achievement of complete integration. We also discuss which features make it more or less likely for this problem to emerge. For instance, if there are two clusters of countries very similar to each other within each group, but with sizeable differences across groups, then it is very likely that a two-speed Europe will never lead to a complete Europe. In more general terms, the final outcome of European monetary integration is path dependent. It *does* matter for the final outcome how and at how many speeds one proceeds.

The paper is organized as follows. Section 2 presents the simple model which we use to make our points; this model draws upon Alesina and Grilli (1992). In section 3 we address the issue of feasibility of a "one-speed" Europe. Section 4 construct an example which shows that a "multi-speed" Europe may not be feasible even when a "one-speed" Europe is. Section 5 discusses these results in light of the provisions of the Maastricht agreement and the current debate. The last section concludes.

2. The Model

As in Alesina and Grilli (1992) we focus on the trade off between credible policies with low inflation and the need to stabilize exogenous shocks with monetary policy. Therefore, we focus exclusively on the trade off between average inflation and variance of output, which is a key issue for the agreement over a common monetary policy in Europe.[3] A second important

issue is the financing of government deficits and the lack of convergence of fiscal policies. However, for reasons of tractability, the fiscal argument is not explicitly formalized here, but our general point concerning the feasibility of one or "multi-speed" Europe goes well beyond the specific model which we adopt in the present paper.

Consider five countries which have to decide whether to form a monetary union or not. For reasons which will become clear later, five is the lowest number of countries necessary to make our point in the simplest possible way, but there is not loss of generality in this choice. For the moment, suppose that these countries are of equal size; a generalization of this assumption is discussed in section 5. The generic country i is characterized by the following loss function:

$$L^i = \frac{1}{2} E\{\pi^2 + \beta_i (x - \bar{x})^2\} \tag{1}$$

where π is inflation; x is output; $\bar{x} > 0$ is the targeted level of output, and $E(\cdot)$ is the expectation operator. This loss function states that the policymakers in the generic country i will attempt to stabilize inflation around the target value of zero, and output around the target value of $\bar{x}$. The parameter β_i, which is the key for our analysis, represent the weight attributed to the output target *relative* to the inflation target. The higher is β_i the more country i cares about output relative to inflation. Output is determined according to the standard expectation-adjusted Phillips curve relation:

$$x = (\pi - \pi^e) + \mu_i \tag{2}$$

where π^e is the expected of inflation. μ_i is a random shock with mean zero and variance equal to $\sigma^2_{\mu_i}$. Equation (2) implies that output increases (decreases) when inflation is higher (lower) than anticipated. When expectations are correct, output has an expected value of zero, while its actual value depends upon the realization of the shock μ_i. Therefore, we have assumed, without loss of generality, that the "natural" level of output is zero, and we have set equal to 1 the partial derivative of output with respect to unexpected inflation.

The loss function given in (1) is adopted by the Central Bank of country i (CB_i) and reflects the country preferences, which for the sake of argument, can be thought of as those of the median voter, or of the political party in office. These preferences imply that CB_i has a target of output $\bar{x}$, which is greater than what would be achieved (on average) by the market without any unexpected inflationary shocks. This wedge between the market generated, "natural", level of output (i.e., zero) and the target level $\bar{x}$, can be justified by the existence of various distortions in the labor market, such as income taxation or workers' unions. These distortions keep employment and output below the level which would be achieved in a non-distorted economy. Thus, the policymakers have an incentive to circumvent these distortions by generating unexpected inflation which increases the level of economic activity.[4]

The countries considered may differ in two dimensions: their preferences summarized by the loss function (1) and the nature of their output shocks, μ_i. The difference in preferences is captured by the parameter β_i. A low β country is one which cares relatively more about inflation and relatively less about output stabilization. The parameter βs are ranked in an increasing order: $\beta_i < \beta_j$ if $i < j$. The second difference involves the variance of μ_i, which

may vary across countries. Furthermore, the degree of correlation between μ_i and the other country shocks is important, as shown in Alesina and Grilli (1992).

Without a monetary union, each country sets its monetary policy (i.e., π) independently. We assume that the monetary authority directly controls inflation. This short cut involves no loss of generality. At the cost of more notation and algebra, one could close the model with a demand and supply for money. No insights for our purposes are gained by complicating the model this way, therefore we keep matters as simple as possible. We assume that without a monetary union, each country is completely isolated, thus we do not have to worry about the complexities of the pre-union exchange regime. This is, of course, a gross simplification but it is somewhat orthogonal to the thrust of our analysis and should not affect the nature of our results.

The timing of events in this model is as follows: at the beginning of each period, wage contracts are set and, more generally, expectations about inflation are formed. Then, the shock μ_i is realized and observed by the CB_i which sets the inflation rate based upon this information. By assumption, wage contracts cannot be contingent on the realization of the shock, nor can they be indexed. The time consistent inflation policy in this set-up is given by:

$$\pi = \beta_i \bar{x} - \frac{\beta_i}{1+\beta_i}\mu_i \tag{3}$$

and the corresponding output level is:

$$x = \frac{1}{1+\beta_i}\mu_i \tag{4}$$

Equation (3) is obtained by substituting (2) into (1), taking the first order conditions with respect to π and then imposing the condition of rationality of expectations, namely $\pi^e = E(\pi)$. Equation (4) is obtained by substituting (3) into (2). From (4) it immediately follows that the variance of output, $\sigma^2_{x_i}$, is given by:

$$\sigma^2_{x_i} = \frac{\sigma^2_{\mu_i}}{(1+\beta_i)^2} \tag{5}$$

This equation shows that monetary policy reduces the variance of output relative to the variance of the shock: $\sigma^2_{x_i} < \sigma_{\mu_i}$. The higher is β_i, i.e., the more the CB_i cares about output relative to inflation, the lower is the output variance.

Equations (3), (4) and (5) highlight a well-known time inconsistency problem: the term $\beta_i\bar{x}$ in equation (3) implies that the average inflation rate is above zero — its target value according to (1) — without any benefits in terms of average or variance of output. In other words, suppose that the CB_i could commit to the following policy:

$$\pi = -\frac{\beta_i}{1+\beta_i}\mu_i \tag{3a}$$

With (3a), instead of (3), the average inflation would be zero, its target value, and the average output is zero and the variance of output would be as in equation (5). Thus, the policy (3a) is superior to (3) because it improves on the inflation front, without affecting output. However, the policy (3a) is time inconsistent. If the public expects this policy, the policymaker has an incentive to revert to policy (3). In doing so, the policymaker creates a one-shot inflation surprise which increases output. Thus, the policy rule (3a) would not be believed if announced, and the credible policy is (3). This policy incorporates an "inflation bias" equal to β_i. Note a key "trade-off": a high β_i implies a high inflation bias, but a low output variance.

As discussed at length in the vast literature on the subject (see Cukierman (1992) for a recent survey) the "inflation bias" problem can be eliminated or reduced in two ways. One way is to commit to the first best policy, which in this model is $\pi = -\beta_i\mu_i$. With this policy rule expected inflation is zero and the output variance is as low as in (5). However, for well-known reasons,[5] the optimal policy is not credible. For several theoretical and empirical reasons, the assumption that irrevocable commitments are feasible is rather uninteresting and we exclude this possibility henceforth.

The second way of reducing the inflation bias is to appoint an independent and "conservative" Central Banker (Rogoff (1985), Lohmann (1992), Alesina and Grilli (1992)). By varying β_i, one can choose different points on the tradeoff between average inflation and output variance. A lower β implies lower average inflation and more output variance. Rogoff (1985) shows that "society" (or the "median voter" as shown by Alesina and Grilli (1992)) would be made better off by appointing an independent Central Banker with a lower "β" than

society itself. This arrangement reduces the inflation bias and allows a better choice on the trade off between inflation and output variance.[6]

For the most part, we assume away this possibility, which is not our focus. Some discussion of "conservative" Central Bankers in the context of the European Monetary Union is postponed to later. For now we proceed under the assumption that each country operates with the objective function given in (1).

A Monetary Union is defined as a situation in which the inflation rate (i.e., monetary policy) is the same for every country, and it is decided by a European Central Bank (ECB). The ECB has the following loss function, where the subscript "eu" indicates European variables:

$$L_{eu} = \frac{1}{2}E\{\pi_{eu}^2 + b(x_{eu} - \bar{x}_{eu})^2\} \tag{6}$$

where European output x_{eu} is given by:

$$x_{eu} = \pi_{eu} - \pi_{eu}^e + \varepsilon \tag{7}$$

The loss function of the ECB is identical to the one discussed above for the individual country, except that the ECB targets "European" variables. The parameter b reflects the relative weight attributed to output relative to inflation in the ECB's objective function: the selection of b is the key for our discussion of the feasibility of the union. The shock ε, with mean zero and variance σ_ε^2, is the European output disturbance. As above, we impose $\bar{x}_{eu} > 0$. This parameter is the European analog of $\bar{x}$ in (1): if we interpret output in per capita terms, then $\bar{x} = \bar{x}_{eu}$. In other

words, the ECB targets a level of European per capita output ($\bar{x}_{eu}$) which is above the "natural" market level of zero. We will proceed under this assumption.

The ECB minimizes (6), given (7) exactly as above, in the case of country i. Therefore we have:

$$\pi_{eu} = b\bar{x}_{eu} - \frac{b}{1+b}\varepsilon \tag{8}$$

and

$$x_{eu} = \frac{1}{1+b}\varepsilon \tag{9}$$

with

$$\sigma^2_{x_{eu}} = \frac{\sigma^2_\varepsilon}{(1+b)^2} \tag{10}$$

The derivation and interpretation of these equations is exactly as above, for the case of a single country.

The crucial question for the feasibility of a European union is whether or not the generic country i is better off with or without the union. In order to answer this question we need to compare the loss with and without the union for country i. The loss of country i without the

union, (L^i) is obtained by substituting (3) and (4) into (1) and by computing expectations. The loss of country i with the union (L_{cu}) can be computed by substituting (8) and (9) into (1). After some algebra (described in more detail in Alesina and Grilli (1992)) one obtains:

$$L^i - L^i_{cu} = \frac{1}{2}\left\{ -\bar{x}^2\left(b^2 - \beta_i^2\right) + (1 + \beta_i)\left[\left(\frac{\beta_i}{1+\beta_i} \right)^2 \sigma^2_{\mu_i} - \left(\frac{b}{1+b} \right)^2 \sigma^2_{\varepsilon} \right] \right.$$

$$\left. + 2\beta_i \left[\left(\frac{b}{1+b} \right) \sigma_{\varepsilon\mu_i} - \left(\frac{\beta_i}{1+\beta_i} \right) \sigma_{\mu_i} \right] \right\} \qquad (11)$$

Equation (11) represents the net gain of joining the union, and $\sigma_{\varepsilon\mu_i}$ is the covariance between μ_i and ε. This expression highlights two distinct components of the difference in welfare with and without a monetary union. The first one is due to differences in preferences, as represented by differences between b and β_i. The second component depends upon economic dissimilarities, summarized by σ^2_{ε}, $\sigma^2_{\mu_i}$ and $\sigma_{\varepsilon\mu_i}$.

Consider first the differences in preferences, and to better focus upon them, let us eliminate the economic difference by assuming $\mu_i = \varepsilon$ in all states of the world, so that $\sigma^2_{\mu_i} = \sigma^2_{\varepsilon} = \sigma_{\varepsilon\mu_i} \equiv \sigma^2$. Then (11) becomes:

$$L^i - L^i_{cu} = \frac{1}{2}\left[-\bar{x}^2(b^2 - \beta_i^2) + \sigma^2 \left(\frac{\beta_i}{1+\beta_i} - \frac{b}{1+b} \right) \left(\frac{1+\beta_i}{1+b} b - \beta_i \right) \right] \qquad (12)$$

Equation (12) is key for the development of our argument. Let us define the gains of the union for country i (G^i) as the following "gain function":

$$G^i(b, \beta_i) = L^i - L^i_{\alpha} \tag{13}$$

The function $G^i(b, \beta_i)$ is rather complex, but several observations can be made before proceeding to a complete study of it. First of all, the gains are zero when the ECB adopts the same β_i parameter as country i, namely:

$$G^i(\beta_i, \beta_i) = 0 \tag{14}$$

In fact, if $b = \beta_i$ it makes no difference for country i to be in the union or not (remember that all the countries are identical in terms of their economic shocks). It is also interesting to check whether country i gains or loses when the ECB stabilizes inflation, without worrying at all about output. That is, we look at what happens if b=0:

$$\begin{aligned} &G(0, \beta_i) \gtrless 0 \qquad \text{if} \\ &\bar{x}^2(1 + \beta_i) \gtrless \sigma_\varepsilon^2 \end{aligned} \tag{15}$$

Equation (15) implies that if the output variance is low, and β_i is high, country i benefits from the union even if the ECB does not stabilize output at all, i.e., $b = 0$. This is the extreme version of the "credibility gains" of the union: country i benefits because the gain in credibility,

which insures a zero inflation, more than compensate for the complete lack of output stabilization. Clearly, this is more likely to happen when the variance of output is low, thus the costs of not stabilizing are low.

Computer simulation show that the function $G(b, \beta_i)$ has the parabola-like shape displayed in Figure 1. Details about the simulation procedure are available upon request. The important features are that this function is single-peaked and crosses the horizontal axis twice: one intersection is at $\beta_i = b$ and the other at $\underline{b} \gtrless 0$ depending upon the inequality in (15). Obviously, from an economic perspective negative values of b are uninteresting and can be ignored. Figure 1a represents the case in which is $\overline{x}^2(1+\beta_i) < \sigma_\varepsilon^2$ and Figure 1b the opposite case. In Figure 1a, if $b > \beta_i$, country i is worse off with the union: the ECB is even less credible than the CB_i. If $b < \underline{b}$, country i loses from the union because the ECB is "too conservative" and does not stabilize enough. The loss in terms of output variance more than compensate the gains in reduced inflation. If $b \in (\underline{b}, \beta_i)$ country i is strictly better off with the union. Within this range of parameter values, the gains in credibility of a low inflation policy more than compensates the reduced stabilization. The optimal choice of b for country i is b_i^*

Let us now briefly discuss how economic differences (i.e., in the shocks) influence the position of the curve $G^i(b, \beta_i)$. Suppose that $\beta_i = b$ for every i, and that the shocks are perfectly correlated, but $\sigma_{\varepsilon_i}^2 \neq \sigma_\varepsilon^2$. Manipulations of (11) readily establish the following:

$$G(b, b) = \frac{1}{2}\left[\frac{b^2}{1+b}(\sigma_\varepsilon^2 - \sigma_\mu^2)^2\right] \tag{16}$$

Therefore, if there are differences between the variance of national and European output, the welfare of the country will be lower in a monetary union, with $\beta_i = b$. The intuition is clear; if $\sigma_i^2 < \sigma_\mu^2$, for instance, the ECB will not be stabilizing enough. Given (16), it is clear that what happens in Figure 1a, if country i has a variance higher than σ_ε^2. The curve $G(\beta_i, b)$ shifts, as in Figure 2. The range of values of b for which country i would join the monetary union shifts up: stabilization is now more valuable, since the variance of output is higher.

Finally, consider the case where the variances of the shocks are all identical, all the βs are the same, but the national shocks are not perfectly correlated, i.e., $\rho_i \neq 1$, where ρ_i is the correlation coefficient between μ_i and ε. Simple manipulations of (11) readily establish the following:

$$G(b, b) = -\frac{1}{2}\left[\frac{b^2}{1+b}\sigma_i^2(1-\rho_i)\right] \tag{17}$$

Therefore, the smaller is the correlation between μ_i and ε the worse off country i is made by its participation in the monetary union. In fact, if ρ_i is low, the ECB will constantly stabilize either too much or not enough from the point of view of country i. For example, in the extreme case of perfect negative correlation, the ECB contracts when country i experiences a recession, and expands when country i experiences an expansion. From equation (17) it follows that if $\rho_i < 1$, the curve of Figure 1a shifts as in Figure 3. If $\rho_i < 1$ the range of values of the parameter b which makes country i better off in the union decreases. In fact, the benefits of stabilization are downplayed by country i, given that the ECB reacts to a shock which is only imperfectly correlated with country i's disturbance.

3. The Feasibility of the Monetary Union

We define as "feasible" a monetary union in which all the participant countries are not worse off with the union than without it. In our framework, the problem of "feasibility" is whether one can find a range of values for the parameter b, which makes every country not worse off with the union.

Consider Figure 4, which plots the G^i curves for three countries, with identical shocks but different βs. Let us call "Germany" country 1, "France" country 2, and "Italy" country 3, recalling that $\beta_1 < \beta_2 < \beta_3$. This figure represents a case in which one can find a range of parameter values for which the union is feasible. This range is given by $b \in [\underline{b}_3, \beta_1]$, where $\underline{b}_3$ represents the lowest feasible b for country 3, Italy.

Suppose that the three countries decide by majority rule on the choice of b, i.e., on the appointment of a Central Banker, who cannot be removed from office.[7] Figure 4 shows that France and Italy would vote against any feasible b smaller than β_1. Thus, the choice of the ECB implies $b = \beta_1$, even though for both France and Italy, β_1 is lower than their optimal choice (b^* and b_2^* respectively). The message is clear: in order to "keep Germany in", the ECB has to be handed to this country: Germany would never join a union with $b > \beta_1$.

Note that Germany would be better off with an even more inflation-averse ECB, namely with $b < \beta_1$; that is, Germany would like to appoint a ECB even more anti-inflationary than its own preferences, if this arrangement were possible. However, France and Italy would vote against any b lower than β_1.[8] In fact, in what follows we disregard the possibility of appointing a Central Banker more anti-inflationary than the most inflation-averse country, i.e., Germany.

More generally, this assumption implies that each country can gain anti-inflation credibility by joining the union, but each country alone cannot appoint a Governor of the Central Bank with preferences different from the country's ones.

This example underlies an element of fragility of the union: Germany is just indifferent between joining the union or not. The consequences of this fragility are highlighted by the following example which may, in fact, capture some elements of the recent (September 1992) turmoil in the ERM. Figure 4 is drawn under the assumption of identical, i.e., perfectly correlated shocks. Suppose now that Germany is hit by a "new" kind of shock which is not perfectly correlated with the rest of Europe. As argued before, this leads to a shift to the left of the G curve for Germany, as in Figure 3. This implies that $b = \beta_1$ is not feasible any more: the feasible set of b's shrinks. If the movement in the German curve $G(b,\beta)$ is large enough, the feasible set may easily become empty. The German unification can be interpreted as a change in the nature of the "shocks" hitting the Germany economy, requiring increasing government borrowing and high interest rates. This shock has, in fact, imposed the kinds of strain on the ERM which are captured by Figure 3.

Figure 5 displays a case in which the union is not feasible; Italy would never hand the ECB to Germany because if $b \leq \beta_1$, Italy is worse off with the union than without. The important question is, then, whether in this situation is it possible to form a union by an appropriate "compensation" of one or more of the three countries. The two most interesting ways of thinking about these "compensations" are: (i) benefits of participating in the union, *beyond* the "credibility" gains; (ii) a "differential" treatment for low inflation countries.

We now examine these two issues in more detail.

(i) *The "benefits" of the union.*

The more enthusiastic supporters of monetary integration have argued that the gains in credibility are only one of the many benefits of the monetary union. Amongst the most cited additional economic benefits are the elimination of exchange volatility, the reduction of transaction costs and the international currency role of the ECU. As for the credibility gains of a monetary union, these other benefits are very difficult to quantify. Nonetheless, the European Commission, in its effort to support the process toward EMU, has provided some estimates, albeit rough and probably over optimistic. It has been argued (see, for example, Emerson and Huhne (1991)) that a reduction of just 0.5 percentage point in real interest rates, following the elimination of exchange rate risk premia, could lead to an increase in Community income of about 5-10 percent in the long run. Savings in transaction costs deriving from the abolishment of cross-currency conversions, would amount to over 15 billion ecu per year (about 0.5 percent Community GDP). Moreover, if, because of EMU, the ecu were to develop in a major international reserve currency, this could imply a once and for all seigniorage revenue of about 28 billion ecu. A different type of benefit is political. Monetary union is a necessary step toward political integration (Alesina and Grilli (1992)). If the latter is viewed a desirable for several economic and non-economic reasons, thus the benefits of political integration have to be included in the calculation of costs and benefits of the monetary union.

Define H_{in} the net additional benefits of joining the union for country i when n countries participate. For example, in our three country example, H_{13} is the benefit for Germany of belonging to a three country union. Thus, for Germany we have

$$\hat{G}^1(b, \beta_1) = G^1(b, \beta_1) + H_{13} \tag{18}$$

where the expression for $G^1(b, \beta_1)$ is the same as above. H_{13} shifts up the gain curve for Germany, and analogous arguments hold for the other countries. Figure 6 shows that because of these shifts, relative to Figure 5, we can now identify a feasible range $b \in [\underline{b}_3, \bar{b}_1]$ for the union. In this example France and Italy strictly prefer $\bar{b}^1$ to any other feasible b, thus $\bar{b}_1$ prevails by majority rule.

For these parameter values, the European monetary policy is less anti-inflationary than German preferences. It follows that the ECB should *not* be handed to Germany: the three countries should share control of the ECB.

One important caveat is, however, that we have assumed that all the costs and benefits of the union (H_{ij}) are observable. If they were not, Germany, for instance, would have an incentive to underreport its true H_{13}, claim that its curve shifted less than what displayed in Figure 6 and argue that the feasible set of bs is smaller than what shown in Figure 6. In particular, Germany may claim that the only feasible point is $b = \underline{b}_3$, which is the most desirable point (for Germany) in the original feasible set.

The problem of revelation of true costs and benefits from joining the union is, we believe, quite important. Each country has an incentive to underreport benefits from joining, in order to achieve a stronger position at the bargaining table. Given the nature of these benefits, often hard to pinpoint in theory and even more in practice, it is quite clear that there is much uncertainty about the magnitude of these H_{ij}. In principle the same argument could be made about the βs in the country loss function. However, one may argue that by observing the

monetary system of each individual country before the union is created, these parameters can be estimated.[9] Obviously, the same argument does not apply to the H_{ij}.

(ii) *"Differential" treatment.*

Consider now the case in which the three countries differ not only in their preferences (i.e., the βs) but also have not perfectly correlated shocks with different variances. This case is displayed in Figure 7. The feasible set is empty: since the German shock is not perfectly correlated with the others, Germany would join a union only if $b < \beta_1$. Thus, even though Italy would accept $b = \beta_1$, Germany itself would not. In fact, Germany needs a gain in credibility to delegate monetary policy to a ECB which does not target the German output fluctuations only.

Suppose now that France and Italy agree to hand the ECB to Germany, letting the bank adopt the β_1 parameter and letting it stabilize the German shock. That is, the ECB not only adopts the German preferences (β_1) but reacts to the fluctuations of the German economy only, rather than to "European" shocks. Then $b = \beta_1$ becomes feasible, since Germany is indifferent between joining the union or not, and the two other countries may still benefit because of the gains in credibility, even though, from their joint of view, the ECB is stabilizing the "wrong" shock. This mechanism is obviously more likely to work if the correlation between shocks is not too low. The idea is clear: the other European countries "buy" German credibility in exchange for a "special treatment" of this country in terms of output stabilization.

This arrangement, however, underlies another element of "fragility" in the union. Suppose that while the ECB stabilizes the German economy, the latter is hit a very large idiosyncratic shock. Then, at least in the short run, monetary policy is completely inadequate

and, possibly, very costly for the other countries. Even though, for the arguments given above, in the long run it is in everybody's interest to "suffer through" the German shock, in the short run the other countries may have to bear large costs. This argument is even stronger if other countries are hit by opposite shocks, while the ECB is stabilizing Germany. Various political or electoral reasons may make the short run performance of the economy extremely important: it may turn out to be extremely painful for a government to have its hands tied and have to sit through a recession with a European Central Bank interested only in the fate of the German economy. We leave it to the judgement of the reader whether or not this hypothetical example bear some resemblance with the recent English/German clash about monetary policy. We think it does.[10]

In summary, this section has provided an answer to a question often heard in the debate over european monetary union: if the benefits of the union are mainly gains in credibility, why would the most "credible" country want to join? In addressing this question we have highlighted an element of fragility in the union; "to keep Germany in" concessions have to be made to this country, which can make the most credible threat of leaving the union. These concessions may become hard to bear for the other countries, especially in hard times. In the next section we continue our analysis of feasibility by considering the "multi-speed" argument.

4. The Feasibility of a "Multi-Speed" Europe

Suppose that a five country union is feasible, as shown in Figure 8, which is drawn for simplicity, and no loss of generality for the case in which $H_{is} \geq 0$ but all the shocks are perfectly correlated and have the same variance. There is no loss of generality in these

assumptions: the argument which follows could be easily extended to the more general case. Remember that we are always assuming for simplicity and, again, with no loss of generality, that all the countries have equal size. Thus a "one country one vote" rule and a weighted vote by size, are equivalent. Let us denote countries 4 and 5 "Portugal" and "Spain" respectively ($\beta_4 < \beta_5$). The range of feasible b is $b \in [\underline{b}_5, \bar{b}_1]$ where $\underline{b}_5$ is the smallest acceptable b for Spain (i.e., the lowest interception of the G curve of Spain with the horizontal axis) and $\bar{b}_1$ is the highest acceptable b for Germany. If the five countries decide, by majority vote which b should be adopted, b_3^* would prevail. This is the b preferred by the median country (i.e., Italy), and is in the feasible set.[11]

Suppose that, instead, we proceed with a "multi-speed" union. For instance, suppose that France and Germany go ahead and unify their monetary first. The feasible set for a Franco-German union is $b \in [\underline{b}_2, \bar{b}_1]$, where $\underline{b}_2$ is the lowest acceptable b for France. Figure 8 shows that b_2^* is in the feasible set of the Franco-German union. Thus, both countries prefer this point to any point above it. Thus, regardless of how the bargaining process between France and Germany is solved, the chosen b is in between $\underline{b}_2$ and b_2^*. By construction, in this example *both* France and Germany are better off with any choice of b in between $\underline{b}_2$ and b_2^*, than with b_3^*, which would be the equilibrium choice in a five country union. Thus, France and Germany will never admit the other three countries as a group.

It is even possible that Germany and France will not want to even admit Italy alone, particularly if Germany takes an "aggressive" position about it. If Italy alone enters, France becomes the median voter in the union. If b_2^* (the optimal b for France) is feasible, then France would be better off in the three-country union. If, however, b_2^* is not feasible, then $\bar{b}_1$ would

prevail in a three-country union. If in the France/German union the chosen b was smaller than $\bar{b}_1$ Germany would oppose the admission of Italy, since $\underline{b}_2$ is below the feasible set for the three countries. If the admission of a new member requires unanimity of members, Italy would not be admitted.

Even if Italy were admitted, the union would stop there. In fact, suppose that Italy is in, and b_2^* is feasible and prevails (Figure 8). France would never want any new members because this country cannot do any better than b_2^*. Germany would also be against new members: new members can only increase the chosen b, which is already above the optimal one for Germany. Thus, there is a two to one majority against new members: the union stops at three.

Therefore, this example shows that it matters a great deal with how many speeds a European Monetary Union is constructed. Our example suggests that even though a five-country Europe is feasible, integration may stop at 2 or 3. The idea is simple. The first group of countries anticipate the political equilibrium which would prevail if Europe is extended. It may easily be the case that a majority in the first group of countries would be worse off in the new political equilibrium. In our example France and Germany are better off alone or, at most, with Italy than with Spain and Portugal.

It is also apparent that the most "credible" low inflation countries should be the most vocal in favor of a "multi-speed" union. They cannot lose from it: either the other countries change behavior and/or preferences (i.e. drop their high βs, perhaps with a political change) and therefore their admission to the union is costless, or the union will stop at the first group.

An interesting question which could be raised is whether it would be in the interest of the countries left out from the "first speed" to form their own union. In the example above, for

instance, Spain and Portugal, if left out, could be ahead and form their union. As for Italy, it is not clear *a priori* whether it would be in its interest to join the Franco-German union or the other one. In the first case Italy would gain in "credibility" and lose on the stabilization front, in the second case the opposite would occur.

In principle, different coalitions could form. One thing which can be said in general is that all the possible coalitions have to include "adjacent" countries, in terms of the G curves. That is, if country 3 is better off joining 4 and 5, instead of 1 and 2, then it cannot be the case that country 4 is better off joining 1 and 2 rather than 3, 4 and 5.

Enlarging the possibilities for coalition formation by considering the possibility of multiple unions in Europe clearly complicates the analysis. However, the key insight emphasized above remains: it does matter how and at how many speeds Europe proceeds toward a monetary union.

5. Discussion

The previous two sections help clarify current events in the process of European monetary integration and its future prospects.

First of all, while we focused on differences in preferences across countries, the same arguments would apply if the countries differed in their economic problems and environment. Different preferences over monetary policy may derive from different shocks (see section 2) or different levels of public debt and deficit. Even though we cast our discussion in terms of the βs, we could have told a similar story in which high β countries are high debt countries. The

incentives to actively use monetary policy, for instance to control interest rates, are increased by a sizeable outstanding stock of government debt.

Second, the probability of stopping at the first stage is increasing if the countries are not of equal size and the largest country has the most extreme preferences, which seems to be the case of Germany. If you go back to the French-German union, if Germany had more than 1/2 of the weight, Italy would never be admitted, while if France had more than 1/2 of the vote, Italy would be admitted by majority vote (see Figure 8). Clearly the country with the weakest interest in expanding the union to countries with higher βs is the country with the lowest one. If this country is the largest, we have a problem.

Third, it is less likely that a "multi-speed" Europe will ever be completed if the countries cluster in two easily distinguishable groups. For instance if β_3, β_4 and β_5 are much higher than β_2, a move from a three to a five-country Europe implies a large increase in the chosen b, because country 3 is now the median voter and β_3 is much larger than β_1 and β_2. The same argument applies to the interpretation of these differences in terms of economic conditions rather than preferences. In this case, as briefly discussed above, an outcome could be the creation of two monetary unions.

Fourth, even though we cast out analysis in terms of the "median voter theorem" (i.e., the decisive voter is median) our results are much more general. In fact, our basic point applies to any voting mechanism adopted within the union. The crucial point is that the first group of countries can anticipate the political equilibrium which would be generated by the next entrants in the union.

The supporters of multi-speed Europe claim that this process allows "weaker" countries "to put their house in order" before joining the union. The Maastricht agreement in some sense follows this approach by setting certain targets which have to be met before joining the union. If these targets are reached, then new members can automatically join the first group of countries, without requiring a new vote. If this were, in fact, the case, then the problems highlighted in the preceding section would disappear: in fact the first group of countries could not vote against the entry of additional members satisfying the pre-set criteria.

The problem with this argument is that the formulation of a target may leave a fair amount of room to different interpretations and, in addition, one may reasonably argue that evolving economic conditions require revisions of such targets. For instance, in the Maastricht agreement, the fiscal targets are so unrealistic for certain countries that their admission to the union is either left to the discretion of the "first speed" countries, or would not materialize in the foreseeable future. The point is that with sufficiently vague, unrealistic, perhaps contingent targets, any agreement leaves a large amount of discretion which can be used by the "first speed" countries to never admit the second group. Sufficiently "loose" targets may boil down to essentially a discretionary decision of the first group of countries to admit the others.

On the other hand, the imposition of pre-specified targets may, in fact, help the more fiscally irresponsible countries to stabilize their budgets. However, an expectation that, because of the problems highlighted above, the first group of countries will never admit the second, may in fact undermine the credibility of the targets themselves.

6. Conclusion

Two questions are often asked by the observers of the process of European Monetary Union: (1) What is in it for Germany?; (2) Is a "multi-speed" Europe a good idea?

This paper has provided answers which raise some concerns over both issues. First, we argue that unless Germany obtains a disproportionate amount of control over the monetary policy of the union, this country will not have much interest in joining. This creates tensions particularly in "hard times". If the European monetary policy follows German preferences, other countries are likely to have to endure the "wrong" monetary policy in times of need. For instance, the British might have to suffer through a lengthy recession without lowering interest rates. If they are not willing to do so, there is no hope for the union, since Germany cannot be asked to agree to change its policies. In more colorful terms, one cannot ask Germany to sell "credibility" for free.

On the idea of a "multi-speed" union, the paper expresses some skepticism. We argue that it is quite likely that once the first group of countries form a restricted union, they will never agree to enlarge it. This may happen even if every country would be better off with a full-scale integration than with no integration at all. Therefore, if the Monetary Union proceeded at "one speed" it would be feasible. Instead, with a multi-speed process, the union would stop at a smaller group of countries.

Similar arguments apply to the extension of the union beyond the current 12 potential members. Whether new members would or would not be admitted, depends very much on their preferences (and economic conditions) relative to the "median" of the twelve country union. For instance, suppose that a potential new member has exactly the same preferences of the median

of the twelve countries. Then, if the "median voter" is decisive in policy formation, European policy does not change. The original members would not oppose the new member, since they might benefit by the enlarged community without any change in policy.

The opposite case is one in which the new entrant has "extreme" preferences so that the "median" may change substantially. In this case, it is much more likely that a majority of the members would oppose the new entrant, because the benefits of the new entry might be more than compensated by the loss due to the change in the political equilibrium of the enlarged union.

Footnotes

1. On this point see also the discussion by Fratianni and von Hagen (1990).

2. *The Economist* (October 2-9, 1992) has recently taken the opposite view.

3. The recent events which led to the devaluation of the pound and its exit from the ERM are an exemplary illustration.

4. See Persson and Tabellini (1990) and Cukierman (1992) for more discussion on this point.

5. See Kydland and Prescott (1977), Barro and Gordon (1983) and Cukierman (1992).

6. For further discussion of this point see Lohmann (1992).

7. If the Central Banker could be removed from office, his appointment would not be "credible". This is one of the arguments in favor of Central Bank independence. For a discussion in the context of the European Monetary Union see Alesina and Grilli (1992). For evidence on the benefits of Central Bank independence see Grilli, Masciandaro and Tabellini (1991) and Alesina and Summers (1993).

8. Note that this is not always the case. Suppose that $b_2^* < \beta_1$, that is the optimal b for France were below β_1, so that $b_1^* < b_2^* < \beta_1$. In this case France and Germany would prefer b_2^* to β_1. If b_2^* were feasible, Italy would stay in the union with b_2^*.

9. For an interesting attempt to estimate these parameters for several EEC countries, see Collins and Giavazzi (1993).

10. One aspect of the September 1992 events which this story does not capture is the alleged clash between the German government and the Bundesbank. The latter was apparently "tougher" on its "anti-lowering rates" policy than the former. This aspect of the story (if at all real) can

be easily explained if we view the Bundesbank as the "conservative" Central Bank of Germany discussed above, as a tool for insuring credible low inflation policies.

11. If $b_3^{\bullet} > \bar{b}_1$, i.e., it is not feasible, then $\bar{b}_1$ is chosen in equilibrium. If $b_3^{\bullet} < \underline{b}_5$, i.e., it is not feasible, then $\underline{b}_5$ is chosen in equilibrium.

References

Alesina, A. and V. Grilli. 1992. The European Central Bank: Reshaping monetary politics in Europe. In *The creation of a Central Bank*, ed. Matthew Canzoneri, Vittorio Grilli and Paul Masson. Cambridge University Press and CEPR.

_____ and L. Summers. 1993. Central Bank independence and economic performance: Some comparative evidence. *Journal of Money, Credit and Banking*. Forthcoming.

Barro, R. and D. Gordon. 1983. Rules, discretion and reputation in a model of monetary policy. *Journal of Monetary Economics* 12, 101-22.

Casella, Alessandra. 1991. The impact of monetary unification on the composition of markets. Unpublished.

Collins, S. and F. Giavazzi. 1993. Attitudes toward inflation and the viability of fixed exchange rates: Evidence from the EMS. In M. Bordo and B. Eichengreen *A retrospective on the Bretton Woods system*. University of Chicago Press and NBER.

Cukierman, A. 1992 *Central Bank strategy Credibility and Independence*. M.I.T. Press, Cambridge, MA.

Emerson, M. and C. Huhne. 1991. *The ECU report*. London: Pan Books.

Fratianni, M. and J. von Hagen (1990). Credibility and Asymmetries in the EMS in V. Argy and P. de Grauwe (eds). *Choosing an Exchange Rate Regime: The Challenge for Smaller Industrial Countries*. Washington DC. IMF.

Giavazzi, F. and A. Giovannini. 1989. *Limiting exchange rate flexibility: The European Monetary System*. Cambridge, MA: MIT Press.

Grilli, V., D. Masciandaro and G. Tabellini. 1991. Political and monetary institutions and public finance policies in the industrial democracies. *Economic Policy*, 13, 101-53.

Krugman, P. 1989. Policy problems of a monetary union. Unpublished.

Kydland, F. and E. Prescott. 1977. Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy* 85, 473-490.

Lohmann, S. 1992. Optimal commitment in monetary policy: Credibility vs. flexibility. *American Economic Review*, 82, 273-86.

Persson, T. and G. Tabellini. 1990. *Macroeconomic policy, credibility and politics*. Harwood Academic Publishers.

Rogoff, K. 1985. The optimal degree of commitment to an intermediate monetary target. *The Quarterly Journal of Economics* 100, 1169-90.

FIGURE 1

The $G(b,\beta_i)$ curve

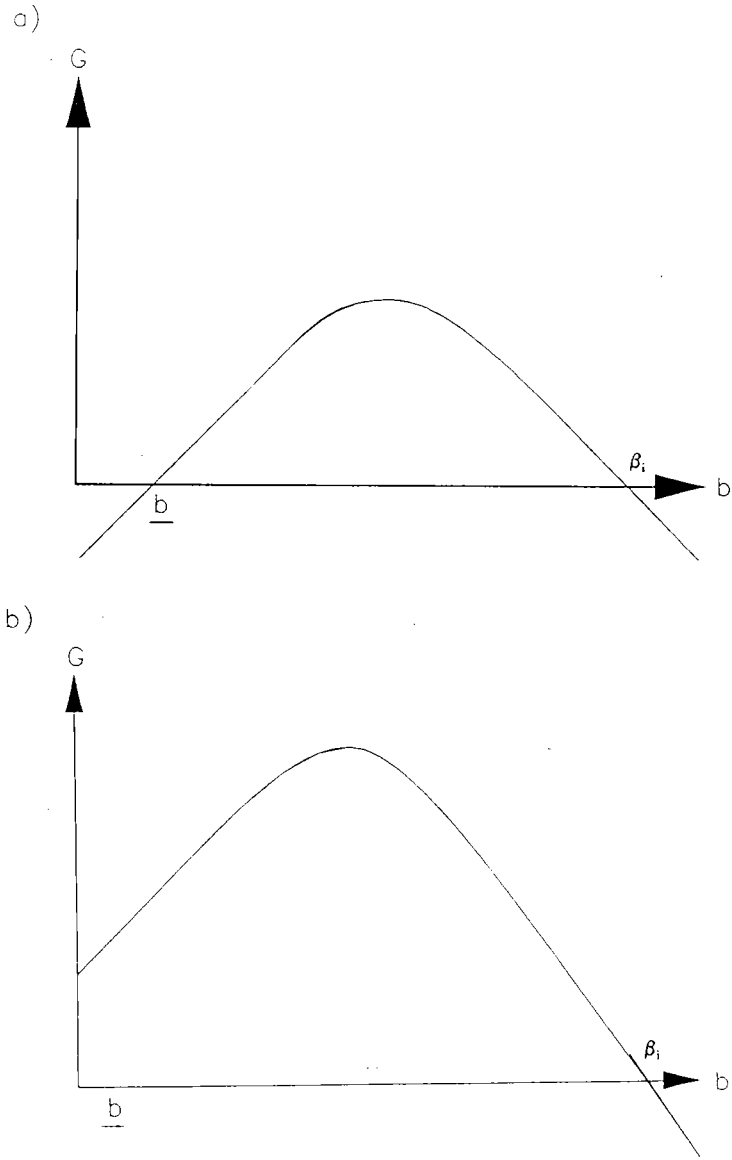
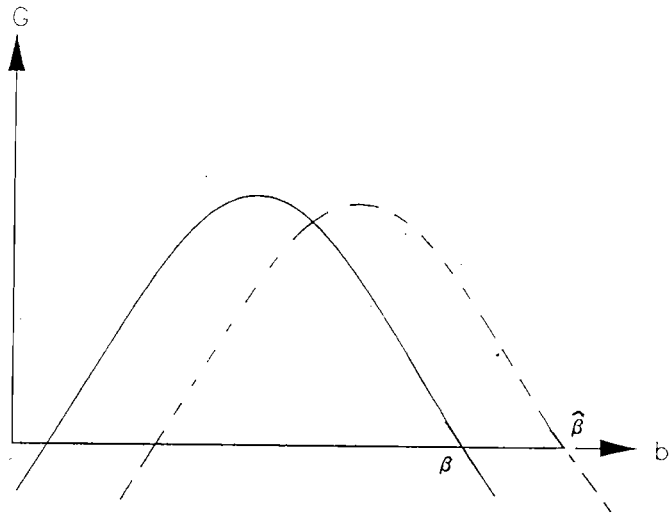


FIGURE 2

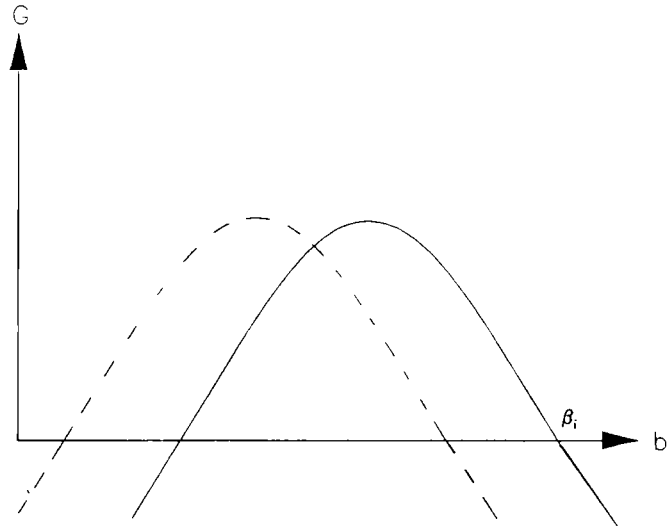
The case of $\beta_i = b$; $\sigma_{\mu i}^2 > \sigma_\varepsilon^2$



- - - - curve with $\sigma_{\mu i}^2 > \sigma_\varepsilon^2$

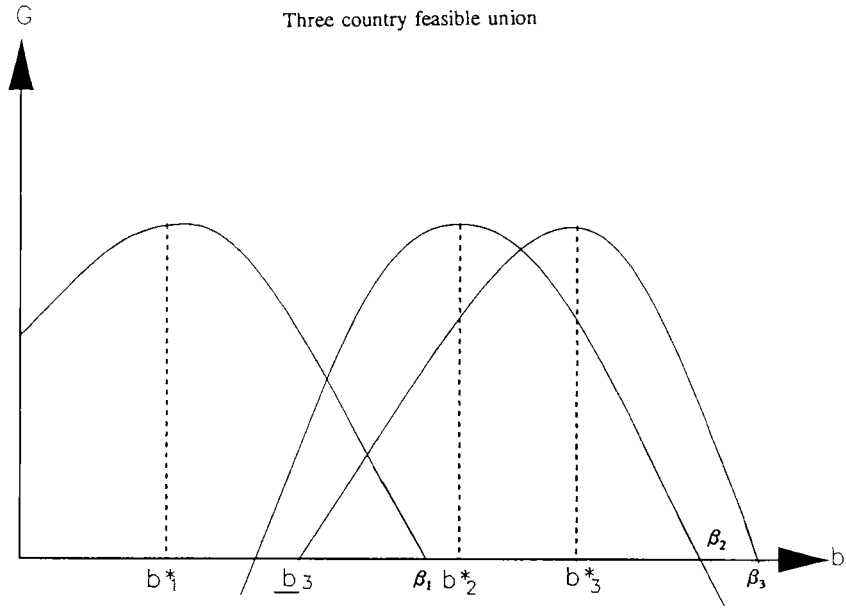
FIGURE 3

The case of $\rho_i < 1$



- - - - curve with $\rho_i < 1$

FIGURE 4



Feasible set:. $b=[\underline{b}_3;\ \beta_1]$

FIGURE 5

A non feasible union

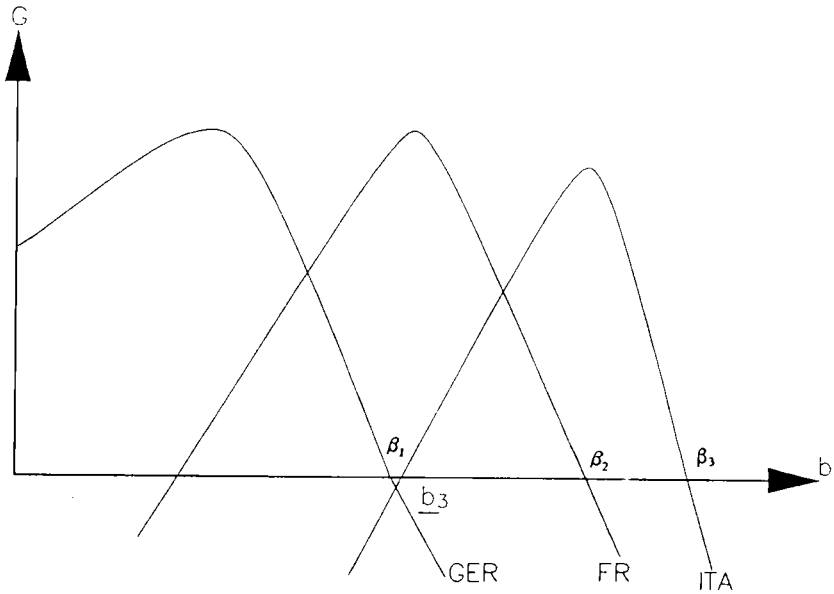
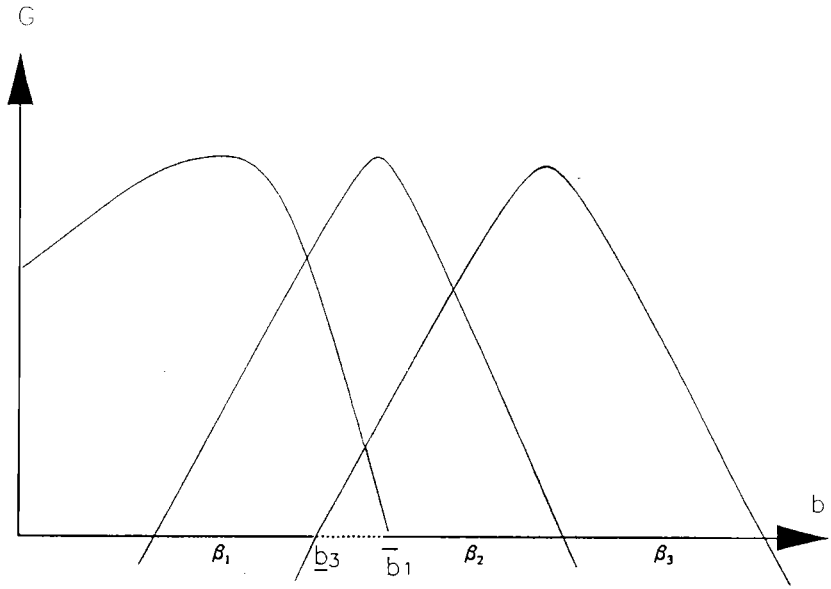


FIGURE 6

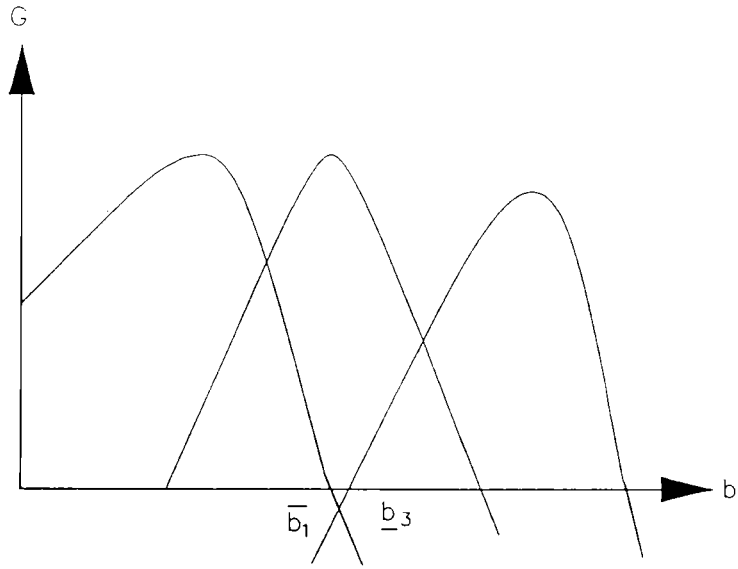
Feasible union with $H_{ij} > 0$



Feasible set: $b=[\underline{b}_3;\ \bar{b}_1]$

FIGURE 7

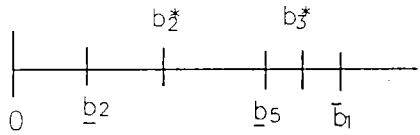
A non feasible union with uncorrelated shocks



$\bar{b}_1 < \underline{b}_3$: highest b for country 1 is lower than lowest b for country 3 => union not feasible.

FIGURE 8

A five country feasible union



G curve not displayed. Union is feasible because $\underline{b}_5 < \bar{b}_1$. Feasible range $b=[\underline{b}_5, \bar{b}_1]$