

No. 590

**A SUGGESTED REFORMULATION OF  
THE THEORY OF OPTIMAL  
CURRENCY AREAS**

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**INTERNATIONAL  
MACROECONOMICS**



**Centre for Economic Policy Research**

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Discussion Paper No. 590  
October 1991

Centre for Economic Policy Research  
6 Duke of York Street  
London SW1Y 6LA  
Tel: (44 71) 930 2963

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October 1991

## ABSTRACT

### A Suggested Reformulation of the Theory of Optimal Currency Areas\*

In contrast to conventional analyses of monetary union between two particular countries or sets of countries, this paper treats the possible expansion of a given currency area as a continuous variable ranging from zero to one; zero if there is no expansion and one if all sources of imports and competition in trade are included in the union. The optimal order in which new members are admitted to the union then becomes one aspect of the problem. It is shown that by using this approach, it is easier to defend the argument that many nations are too small to form optimal currency areas. The demands upon the origin of the shocks, factor mobility, and political organization are smaller. The approach also fits better with the evidence.

JEL classification: F02, F40, F15

Keywords: Optimum Currency Area, exchange rate regime, European Monetary Union, fiscal federalism, monetary reform

Jacques Mélitz  
Institut National de la Statistique  
et des Etudes Economiques  
18 Boulevard Adolphe Pinard  
Paris 75014  
FRANCE  
Tel: (33 1) 4540 0846

\*This paper is produced as part of a CEPR research programme on *Financial and Monetary Integration in Europe*, supported by a grant from the Commission of the European Communities under its SPES Programme (no. E89300105/RES).

Submitted 14 October 1991

## NON-TECHNICAL SUMMARY

The theory of optimal currency areas (OCAs) is often suggested as a framework for analysing European policy issues. Yet the theory frequently leaves us perplexed. We look to it for guidance in studying the potential costs and benefits of monetary integration over a wider area, despite the fact that the theory suggests that existing currency areas may already be too large. This paradox arises, I suggest, because we view integration as the possible monetary unification of one country with another country or set of countries – Canada with the United States, the Benelux with the rest of the European Community (EC). A more illuminating perspective results if we consider a common currency area – as small as we like (Wales or Michigan) – in relation to the rest of the world. We can then consider whether the area should be enlarged, and if so by how much and with whom. This approach tends to confirm our intuition that many existing nations are too small to form OCAs, since it does not lead us to exaggerate the costs of widening the currency area.

Belgium, for example, trades with all five continents as well as its immediate neighbours. It can only alter its exchange rate with respect to all its trading partners at once, however. If it varies its prices instead, it can do so by a different amount for each product, and implicitly, therefore, by destination (on a weighted-average basis). Hence, the analogy between exchange rate and price level adjustment is rarely perfect. There are many things that a country can *never* do by changing its exchange rate alone. In addition, it is simply incorrect to argue that if Belgium enters into a common currency area, it can no longer adjust its exchange rate – as false as it would be to pretend that no major exchange rate adjustment can take place for northern France. Of course, once inside a monetary union the adjustment of the Belgian exchange rate will no longer depend solely on Belgium. As long as the country carries some political weight in the union, however, and has joined with others sufficiently like itself, it will still be able to take advantage of adjustments in the exchange rate. The usual emphasis on asymmetric shocks therefore is exaggerated: Belgium cannot respond any better to asymmetric shocks today than it could as a member of a larger monetary union. A change in the price of the Belgian franc, as such, offers the right adjustment for a only limited class of asymmetric shocks.

This approach to the issue of nominal and real exchange rate adjustment inside and outside of a monetary union – that is, not as a matter of either/or but more-or-less – sets the tone for the entire discussion. The analysis is in many ways close to McKinnon who first stressed the issue of openness in connection with the exchange rate regime. Indeed there is little here that has not been anticipated either by him or by Mundell in his pioneering 1961 article. As regards the benefits of monetary union, both authors struck an important note which reverberates in

the paper, which is that a flexible exchange rate impairs the performance of money as a unit of account; and therefore the establishment of a zone of fixed exchange rates can be fruitfully seen as an intermediate step between flexible exchange rates and a common currency area. Krugman sets forth this view in a recent article. I follow him in this respect but not in analysing the transition from flexible to fixed exchange rates before admitting a common currency. Rather I prefer to compare the two extremes first – flexible rates and a common currency – before returning to the intermediate stage of fixed exchange rates.

The analysis proceeds by treating the size of the common currency area as a continuous variable ranging from zero to one: zero if there is no enlargement, one if all sources of imports and competition in trade are included in the union. Thus 50% would represent the case where the union covers one-half of the country's trade based on the proper system of double weights, or taking into account competition with foreigners for markets both at home and abroad. More specifically, this figure will be assumed to rest on the usual country weights serving in the construction of multilateral effective exchange rates. What are the costs and benefits of increasing the variable from zero towards one? On the cost side, everything depends on sticky prices and wages. If prices and wages were perfectly flexible, there would be no costs incurred in keeping the exchange rate fixed. The presence of price and wage inertia means, however, that fixed exchange rates impair real exchange rate adjustment in the short run. Either quantities adjust or else there must be queues. Either way, costs emerge, of which unemployment is by far the most important. Two sources of these costs will be distinguished: one arising from within the union, the other from relations with the outside.

Whoever the new partners in the monetary union may be, adjustments in the terms of trade with them will no longer be possible by moving the exchange rate, but will require changes in commodity prices and wages. This is one source of costs. The other source arises from the need for trade equilibrium in the union as a whole. Independently of any monetary union, the current account of each and every nation individually must be equilibrated in the long run. In the case of a monetary union, the joint equilibrium of the current account of all the members will affect their joint exchange rate. Consequently, each union member will be subject to changes in its real exchange rate that it would not otherwise have experienced. Any difference between the condition for trade equilibrium at home and the similar condition for the union as a whole will cause each member to be invaded by price pressures which it would have escaped outside the union. I disregard the possible tendency towards higher capital mobility inside the union and other similar dynamic considerations in order to facilitate the satisfaction of the equilibrium conditions in home trade.

Minimizing the costs arising from the first source involves choosing new partners with which one is likely to require the least real exchange rate adjustment.

Thereby one will make sure that the extra need for price adjustment is low and exchange rate flexibility retains as large a role as possible. Geographical proximity of trade partners will contribute by reducing transportation costs. Similarity of industrial structure will also assist by keeping relative prices more closely in line. Minimizing the costs arising from the second source will mean giving priority to trade partners who are similar in age structure, propensity to save, and long-run factor productivity. The impact of these next influences is difficult to assess and the shocks affecting them infrequent. For these reasons I will assume – though this is by no means fundamental – that the first source of influences dominates. If so, priority in the choice of countries will be based on geographical proximity and similarity of industrial structure.

The optimal order in which new members are admitted to the union becomes one aspect of the problem. Attention naturally focuses on what makes one potential partner better than another. The same analysis can be repeated for the case of an area of fixed exchange rates instead of a common currency. Again, the size of the area is seen as a continuous variable. At the close of the theoretical sections, the present formulation is compared with the general evidence – in particular, on openness, exchange rate regimes and exchange rate movements – and it is argued that the formulation fits better. Next, I discuss three vital topics: (1) asymmetric shocks; (2) labour mobility; and (3) fiscal federalism.

Shocks that interfere with the net benefits of monetary union are plainly asymmetric, but not all asymmetric shocks argue against monetary union. Once we recognize the resemblance of a nation's exportables to those of some of its geographical neighbours, as opposed to competitors as a whole, we find that the class of situations where a country's output is generally mispriced looks much smaller. Of course, this is all the more true if we abstract, as we do, from all of the causes of mispricing that arise from domestic monetary and wage policy. Consider a shock that depresses the English midlands, Belgium, northern France and northern Germany. The shock is plainly asymmetric; but there is limited scope for combating it by altering exchange rates within the EC.

Nothing has been said thus far about the famous Mundellian criterion of labour mobility in defining an OCA. Upon reflection, the analysis is entirely compatible with total immobility of labour internationally. According to the reasoning, France could belong to an OCA traversing a number of frontiers that French workers will not cross.

I argue that Mundell's view belongs to the era of long-run Philips curves and should have been abandoned when this notion fell into disrepute in the early 1970s. The issue is best analysed by looking at Mundell's example of a shift of excess demand for goods from eastern Canada to its west coast. If monetary policy stays the same, then given a separate long-run Philips curve in the eastern region, the unemployment in the East would last forever. If the only relevant

Philips curve in Canada applies to the country as a whole, however, the unemployment in the East will eventually disappear. Mobility of labour between East and West will resolve the problem despite fixed exchange rates between East and West and downwardly inflexible money wages in the East. A zone of labour mobility – that is, a surface over which a single long-run Philips curve rules – might then seem to qualify as a criterion of an OCA. As a matter of fact, the appearance is deceptive since, as Mundell also emphasizes, a flexible exchange rate of the Canadian dollar can do nothing to smooth the adjustment to the particular shock he calls to mind. My basic point, however, is that once we reject a long-run trade-off between unemployment and inflation and insist instead on the flexibility of prices in the long run, Mundell's criterion of labour mobility loses much of its appeal.

In this case, long-run unemployment will be the same in western and eastern Canada, regardless of labour mobility between the two regions, and of a fixed or flexible east Canadian dollar relative to that of western Canada. The issue must therefore be one of the difference in the costs of adjustment with a fixed as opposed to a flexible exchange rate. Labour mobility will unambiguously improve the case for a fixed rate, but so will capital mobility and any degree of price adjustment in the short run. The basic question therefore is one of the role of labour mobility in an overall judgement. On this matter, the facts do little to buttress the post-Mundellian fascination with labour mobility. Wide and persistent regional differences in rates of unemployment exist in West European countries: Italy, Spain and the United Kingdom in particular.

Fiscal federalism is another big topic. Kenen observed in 1969 that in a country possessing a central fiscal authority any jolts rocking a specific region will automatically give rise to some compensatory income movements from other regions through national taxes and transfer payments. For countries with central-government budgets of the size of the US, this mechanism appears to be extremely important. Sachs and Sala-i-Martin (1989) estimate that around 35% of any regional shock will be offset by the operation of federal taxes and expenditures in the US, three-quarters of the offset coming from the income tax, the rest from unemployment compensation. In more recent work, von Hagen (1991) finds the offset to be substantially smaller in the case of a transitory shock, but essentially confirms Sachs and Sala-i- Martin's results for shocks lasting at least a year or two. It appears, therefore, that countries possessing a large national government budget are likely to constitute a single OCA, if only for this reason. In terms of the present analysis, Kenen's argument suggests, quite explicitly, that if we begin the interrogation with a region of a country, the marginal cost of increasing the size of the common currency area will be particularly low until the currency area attains the size of the entire nation, at which point the marginal cost will jump up. Why not then simply begin the analysis with the nation? In couching the discussion in terms of countries and possible

associations between countries, I have implicitly leaned on Kenen as well as domestic factor mobility.

Of course, the only decision in this context that any government can really take by itself is to peg its exchange rate to another currency or basket of currencies. Hence, achieving an optimal zone of fixed exchange rates or an optimal currency area is not an optimization exercise in the usual sense, but requires concerted action. Furthermore, when the issue of an OCA does arise, membership will usually be determined from the start, largely by non-monetary considerations. Accordingly, if we look at the establishment of the EC, we are unlikely to find that the next six countries admitted represent the optimal choice – certainly not on monetary grounds alone. To take another important example, the current centripetal forces operating in the Soviet Union are likely to pose the question of an OCA for this vast territory. Among other things, the extent of the OCA in the USSR will tend to fall as the proportional significance of trade between the individual Soviet republics drops and the central government loses many of the sources of its revenue (which will limit the scope for any central system of taxes and transfers to absorb regional shocks). Whenever the question of monetary integration over a smaller geographical surface arises, however, the relevant membership will always be circumscribed and the criteria will never be strictly monetary.

Nevertheless, I believe that the recommended degree of abstraction – in particular concerning the actual membership – is a key to proper analysis. What I try to show in the paper is that many things fall into place if we take as our starting-point a political unit (which is taken to be indivisible), and then think in terms of the progressive enlargement of this currency area. The argument that the vast majority of countries are too small to form an OCA by themselves becomes much easier to defend. The demands upon the origins of the shocks, labour mobility and political organization seem less formidable than they often have in the past. The recommended degree of abstraction is basically needed to harvest the benefits of marginal analysis. In terms of specific applications, the argument does not resolve the question of whether the community is an OCA; but it is a step in that direction. On an even more positive note, though the argument may not tell us whether the Russian republic is an OCA, it strongly suggests that Georgia and Azerbaijan are not.



# A Suggested Reformulation of the Theory of Optimal Currency Areas

Jacques Mélitz\*

## I. Introduction

Events in Europe regularly call up the theory of optimal currency areas (OCA's) for contemplation.<sup>(1)</sup> Yet the theory frequently leaves us perplexed. We look for guidance from it in studying possible monetary integration over a wider area while the theory never ceases to suggest to us that existing common currencies areas may already be too large. A good deal of the problem, I will suggest, comes from the habit of applying the schema to the possible monetary unification of a country with a particular other or set of others -- Canada with the United States, the Benelux with the rest of the European Community (EC). A better perspective results if we consider the matter of any common currency area -- as small as we may like (Wales or Michigan) -- in relation to the rest of the world. Then we can consider whether the area should simply be enlarged and if so by how much and with whom. In this way our intuition that many existing nations are too small to form OCA's will receive firmer support. The basic reason is that we will then not exaggerate the costs of enlarging the area.

Belgium, for example, trades with all five continents as well as its immediate neighbors. But the country can only alter its exchange rate with respect to everybody at once. If instead of moving its exchange rate, Belgium varies its prices, it can do so differentially by product, and if only by implication, thereby by destination (on a weighted-average basis). Hence, the analogy between exchange rate and price level adjustment is rarely perfect. There is a lot that a country can never do by changing its exchange rate alone. In addition, it is simply false to pretend that if Belgium enters into a common currency area, major exchange rate adjustment is no longer possible for the nation -- just as false as it

northern France. Of course, once inside a monetary union, the adjustment of the Belgian exchange rate will no longer depend solely on Belgium. But as long as the country carries some political weight in the union and has joined up with others sufficiently like itself, it will still enjoy a lot of corrective movement in the exchange rate. The usual emphasis on asymmetric shocks therefore is overdone. Belgium cannot respond any better to numerous asymmetric shocks now than it could as a member of a larger monetary union. A change in the price of the Belgian franc, as such, can only bring the right adjustment to a limited class of asymmetric shocks.

This way of thinking about the issue of nominal and real exchange rate adjustment in and out of a monetary union -- that is, not as a matter of either-or but more or less -- sets the tone for the entire discussion. The analysis is in many ways close to McKinnon (1963), who first stressed the issue of openness in connection with the exchange rate regime. Indeed there is little here that has not been anticipated either by him or by Mundell in his pioneering 1961 article. As regards the benefits of monetary union, one important note that both of these authors struck and that will reverberate below is that a flexible exchange rate impairs the performance of money as a unit of account; and therefore the establishment of a zone of fixed exchange rates can be fruitfully seen as an intermediate step between flexible exchange rates and a common currency area. Krugman (1990) sets forth this view nicely in an expository piece. I will follow him in this respect but not in analyzing the transition from flexible to fixed exchange rates before admitting a common currency. Rather I prefer to compare the two extremes first -- flexible rates and a common currency -- before returning to the intermediate stage of fixed exchange rates. Another issue which will come up late in the paper concerns the reasons for treating the OCA as stretching at least to the limits of the nation-state. Labor and capital mobility is one such reason; the operation of a national system of taxes and transfers is

another (Kenen (1969)). Both mechanisms are important. But these two mechanisms, I shall argue, occupy too large a place in the literature on the OCA.

## II. The OCA in a world of flexible exchange rates

Consider an individual country in a world of perfectly flexible exchange rates. Let us take the degree of openness of the country as given. Later we will examine what difference changes in this degree of openness will make. The measure of openness will be the value-added of trade in total output, or the ratio of imports or exports to output after removing the export-content of imports (or the import-content of exports). In the early part of the discussion, we shall find it convenient to view the fixed degree of openness as very large, say 25 percent.

Next, let the size of the common currency area be a variable  $u$  ranging from zero to one, zero if there is no enlargement, one if all sources of imports and competition in trade are embraced. Thus, fifty percent would be the case where the union covers one-half of the country's trade. In the spirit of the analysis, this percent of trade should be interpreted multilaterally, or taking into account competition with foreigners for world markets everywhere.  $u$  can thus be approximated by the usual country weights serving in the construction of multilateral effective exchange rates. Questions of monetary policy will be left to the side. This is admittedly a limitation. But since policy preferences may differ within an OCA, there is much to be said in favor of keeping the policy issues apart.<sup>(2)</sup>

What are the costs and benefits of increasing  $u$  from zero toward one? On the cost side, everything depends on sticky prices and wages. If prices and wages were perfectly flexible, there would be no costs of keeping the exchange rate fixed. The presence of price and wage inertia, however, means that fixed exchange rates impair real exchange rate adjustment in the short run. Either volumes move additionally or else there must be queues. Either way, costs

most important. Two sources of these costs will be distinguished: one of them arising from within the union, the other from relations with the outside.

Whoever the new partners in the monetary union may be, adjustments in the terms of trade with them will no longer be possible by moving the exchange rate but will require changes in commodity prices and wages. This is one source of the costs. The other source regards the exchange rate movements stemming from pressures elsewhere in the union. In a monetary union, the joint equilibrium of the current account of all the members will affect their joint exchange rate. Consequently, each union member will be subject to changes in his real exchange rate that he would not have experienced outside the union. That is, any difference between the condition for trade equilibrium at home and the similar condition for the union as a whole will cause each member to be invaded by price pressures which he would otherwise have escaped. (I disregard the possible tendency for easier satisfaction of the equilibrium condition in home trade because of higher capital mobility and other similar dynamic considerations inside the union.)

The costs arising from both of these sources will vary considerably depending on the identity of fellow union members. For any given value of  $u$ , a separate issue of the optimal choice of union partners therefore crops up.<sup>(3)</sup> This next issue is vital.

Suppose that existing prices are the best estimates of future prices. Consequently, based on the previous reasoning, for any given  $u$ , the optimal composition of union members can be viewed as the one that minimizes the expected variance of:

$$(p_U^*/p) + (p_O^*/e_U p_U - p^*/ep) \quad (1)$$

The  $p$  terms in this expression are weighted-average prices of traded goods.  $p_U^*$  is the weighted-average price of these goods in the rest of the union;  $p$  the one at home;  $p_O^*$  the one outside the union;  $p_U$  the one inside the union ( $p_U^*$  and  $p$  combined); and  $p^*$  the one abroad ( $p_U^*$  and  $p_O^*$  combined).  $e_U$  is the multilateral

effective exchange rate of the union currency; and  $e$  is the similar effective exchange rate of the home currency in the absence of a union. Thus, the first parenthetical term refers to relative prices inside the union and the second one to the difference between the real exchange rate of the currency at home inside the union and outside of it. As clearly seen, the first parenthetical term relates to the first factor in the previous discussion and the second term to the second factor.

Minimizing the expected variance of the first parenthetical term is to pick partners with respect to which one is likely to require as little adjustment in terms of trade as possible. Thereby one makes sure that the extra need for price adjustment is low and exchange rate flexibility retains as large a role as possible in facilitating adjustment in aggregate trade. Geographical proximity of trade partners will contribute by reducing transportation costs. Similarity of industrial structure will also assist by keeping relative prices more closely in line. Minimizing the expected variance of the second factor means to pick partners so as to require as little change as possible in the real exchange rate of the new currency relative to the old one and thereby avoid extra movement in prices that are necessitated by the new equilibrium real exchange rate. If exchange rate expectations rest on fundamentals, as we shall suppose, this will mean picking partners which have similar current account positions and prospects as oneself and therefore, whatever else, who will make similar intertemporal choices. On this basis, the right partners will be ones of similar age structure, similar propensity to save, and similar long run factor productivity. The project of monetary union in the EC might suggest that of the foregoing considerations, geographical proximity and similarity of industrial structure are the dominant ones. But this is not important.<sup>(4)</sup>

The most critical point by far is that the optimization of the composition of union partners means that the better partners will be picked first.

additions to costs as worse and worse candidates are included. This rise in marginal cost is an essential condition for the possibility of an optimal value of  $u$  which is positive but less than one. Note that the minimization of the expected variance of expression (1) is intended *both* to lose as little as possible by giving up exchange rate flexibility inside the union *and* to get as much as possible out of exchange rate adjustment with the outside. This links up with the introductory section in an obvious way.

A simple formalization of the argument is possible. The costs of monetary union,  $C(u)$ , can be stated as follows:

$$C(u) = \frac{u^\pi}{1-u} \frac{A}{x} \quad (2)$$

$$0 < x < 1 \quad 0 \leq u \leq 1 \quad \pi \geq 1$$

where  $A$  is a positive coefficient,  $x$  is the trade ratio (provisionally set at 0.25), and  $\pi$  is a general function of the composition of union partners.  $x$  is given, while  $u$  and the value of the function  $\pi$  are choice variables. As thus framed, the higher  $x$ , the lower the costs of monetary union. The higher  $u$ , the higher these costs. The costs of monetary union also go to infinity as  $u$  goes to one. Therefore the world is not an OCA. The  $\pi$  function, which depends on the combination of union partners, is supposed to be exclusively a reflection of the variance of expression (1) associated with the identity of the partners. This function would be extremely difficult to formulate precisely, but I skirt the issue by assuming simply that, for all values of  $u$ , the best combination of partners yields  $\pi$  equal one.

Figure 1 plots the first derivative of  $C(u)$  with respect to  $u$  for  $\pi = 1$  and  $x = 0.25$ . The positive slope, in conformity with equation (2), reflects the choice of the better partners at the start. The smoothness of the curve signifies that the world can be carved up into every possible trade size. So far as this is not true, obviously the curve is only an approximation.(5)

The benefits side calls for less discussion. The gains of monetary union consist of improvements in the quality of money both as a unit of account and as a medium of exchange. To simplify, I will assume that the benefits do not depend on the composition of the union. Otherwise, the best solution at any given  $u$  might differ from the cost-minimizing one. But this does not seem to be particularly insightful. Nor do I see any interest in recognizing increasing or diminishing returns to widening the union -- that is, so long as we begin with a country which is not so small as to make increasing returns likely, therefore larger than Luxembourg but, say, smaller than Greece or Ireland. Let us therefore adopt the simple formula

$$R(u) = uxB \quad (3)$$

where  $R(u)$  refers to the benefits of monetary union and  $B$  is a new positive parameter. This next equation gives rise to a constant marginal benefit curve, like the one illustrated in figure 1. The optimal  $u$ ,  $u^*$ , is shown in the figure as 0.50, which is around the individual-country average in the EC relative to the EC as a whole.

What about openness? The idea that the benefits of monetary union rise with openness needs no elaboration. On the other hand, the fall in the costs with openness do. Various reasons for the negative effect of openness on the costs of keeping an exchange rate fixed are suggested in the literature, but I will retain only those that receive empirical support. There are two. The first is the higher marginal propensity to import of more open countries. This higher propensity means a lower dependence on real exchange adjustment in order to equilibrate trade. The second is the lower impact of the exchange rate in the case of more open countries resulting from quicker adjustments of import prices and wages and consequently faster responses of domestic prices of traded goods. This next factor implies a smaller ability of the exchange rate to alter the

real terms of trade. In their broad survey of the international evidence on

generalizations that Goldstein and Khan (1985) endorse. To quote: "The larger, less-open industrial countries face smaller price feedbacks and can hold on to more of the initial competitive price advantage conferred by exchange rate changes than the smaller more-open economies" (p. 1097).<sup>(6)</sup> The lesser value of exchange rate flexibility for open countries, which is thus indicated, echoes the idea in the introduction that prices may need to be altered individually rather than across the board in order to adjust the terms of trade.

Figure 2 shows the total costs and total benefits of monetary union as a function of openness. There is a similar diagram in Krugman (1990). The difference is that the cost and benefit curves now relate explicitly to a particular size monetary union. Two values of  $u$  are represented: five percent and fifty percent. The figure illustrates the usual view that the U.S. is sufficiently closed to be an OCA all by itself. Thus,  $x$  must be at least 14 percent for a  $u$  level as low as 5 percent to yield any improvement; and at around 10 to 12 percent openness, or about the U.S. level, any warranted expansion of the currency area would be less than five percent. The example is also consistent with the earlier figure showing that if  $x$  is as large as 25 percent, the OCA ( $u^*$ ) is fifty percent. For  $u=0.50$ , the level of openness at which monetary union becomes profitable is below 0.25. All of these numbers agree with the algebra.<sup>(7)</sup>

### III. The optimal fixed exchange rate area in a world of flexible exchange rates

Consider next the same situation as before with flexible exchange rates if the issue is to become a member of a zone of fixed exchange rates rather than to join a monetary union. The precise character of the fixed-rate system will not detain us. It may be of a Bretton-Woods kind with a designated leader, or of an EMS (European Monetary System) variety with no explicit leader, or something else. The essential feature is the presence of an international agreement to peg rates within a narrow band. Suppose we designate a variable



s, going from zero to one, to measure the size of the fixed-rate area. The costs associated with s are unambiguously lower than those connected with u. They must be so since exchange rate adjustments (devaluations, revaluations, or realignments) remain possible by definition given multiple central banks and separate currencies. There will then be the same problem as before of the optimal composition of partners as s goes from zero to one. Further, the solution will still depend on the earlier considerations, as the costs associated with s will hinge on an impaired ability to adjust the exchange rate among the parties to the agreement and (in correspondence with the earlier issue of joint equilibrium) on the extra pressures on each member currency coming from forces acting upon the rest. I see no reason therefore for any difference in the optimal composition of partners for any  $s = u$ . That is, the assumption of the same composition in both cases seems reasonable and convenient. On this ground, let us simply say

$$C(s) = \frac{s\pi}{1-cs} \frac{A}{x} \quad (4)$$

$$0 < c < 1$$

where the new coefficient c certifies that C(s) is lower than C(u) for any  $s = u$ . The motive for modifying equation (2) in this particular way is to allow for the possibility of an optimal value of s of one (or  $s^* = 1$ ). We do not want to deny the chance that a Bretton-Woods type of system comprising the entire world would be best, at least for for some countries -- namely, ones that are sufficiently open. According to equation (4), even for  $s = 1$ , C(s) is still finite.

On the benefits side, s values yield lower monetary advantages than identical u ones, since the gains of a better unit of account are captured (though not entirely), while those of a better medium of exchange are not.<sup>(8)</sup> Indeed, if the system of fixed exchange rates should require stringent capital controls, the quality of money as a medium of exchange will deteriorate, and any net improvement in monetary services is not even certain. Obviously we must limit

the analysis to instances where net monetary advantages are unquestionable. Equation (5) represents the associated benefits,  $R(s)$ :

$$R(s) = rxsB \quad 0 < r < 1 \quad (5)$$

$r$  being a new coefficient.

Figure 3 compares  $s^*$  and  $u^*$  -- the optimal fixed exchange rate area with the optimal currency area. It illustrates a case where  $s^* < u^*$ . This example is in line with the important view of the European Commission (1990) in One Market, one Money that the members of the EMS now bear many of the disadvantages of fixed exchange rates without yet reaping most of the benefits of a common currency and therefore still have much to gain from moving to monetary union. However, the theory also admits the opposite view  $s^* > u^*$ . This contrasting possibility is clear since  $c$  could be lower relative to  $r$ . But even for the same values of the coefficients  $c$  and  $r$ , the possibility  $s^* > u^*$  is plain since as  $x$  goes down, the amount by which  $C(u)$  exceeds  $C(s)$  grows without limit. Thus, for low enough values of  $x$  with everything else constant,  $u^*$  could easily be zero while  $s^*$  is positive. The model therefore readily accommodates the argument that the United Kingdom was right to join the EMS but would be well advised to leave if it became a question of membership in a European Monetary Union (EMU). Of course, should this be true for the UK, according to the model, it would also be so for any other EC member no more open than the UK. The only national differences thus far pertain to openness. But this could be repaired if it was regarded as a problem.

#### IV. Discussion

I shall proceed to argue that the present formulation fits better with the empirical evidence and then comment on three vital topics: (1) asymmetric shocks; (2) labor mobility; and (3) fiscal federalism.

It is important to observe at the start that a great many nations currently fix their exchange rates. For some years now, the IMF regularly publishes an

annual report on Exchange Arrangements and Exchange Restrictions. The most recent reports show over 90 members of the organization as pegging their exchange rates, apart from the EMS countries which are separately classified along with a number of others as practising a near peg. Only about fifteen currencies are reported as independently floating. There are also 25 additional cases of currencies which are counted as managed with varying degrees of stringency. It would be difficult to explain this high incidence of fixed exchange rates and the low number of floats without some version of the theory of OCA's. The only pegs or near pegs resulting from an international agreement are those in the EMS. (The IMF sample excludes most of the former East European Socialist bloc.) Thus, apart from the EMS, no international game-theoretical explanation of the pegs is even possible. National game-theoretical explanations may still be sought, but the well-known political demands of such models limit their application.

Of particular moment is the value of the present formulation of the theory of OCA's in interpreting the data on openness. According to the ruling view in the field, the decisions of the EMS members to fix their exchange rates can best be reconciled with those of the U.S. and Japan to float on the basis of the higher openness in the EMS. While this view seems quite reasonable on the whole, it really only makes sense on the present interpretation. That is, if the usual bilateral treatment of the problem were correct, what would matter is trade among the countries who fix their exchange rates with one another, and in this case the foregoing view would be extremely precarious.

The first column of table 1 shows the figures that are usually cited for openness in the EMS countries, the U.S. and Japan. These numbers unfortunately make no allowance for the export-content of imports and thus give disproportionate emphasis to merchant and retail trade, as the entry of over 100 percent openness for Luxembourg should convince anyone. Once we make the

column, or by about two-fifth on average -- in one case, the Netherlands, by well over one-half. Next, if we consider only the trade of the EMS members with one another, the figures drop another 50 percent or so. Consequently, we come to column 3, where the numbers are now clearly below 10 percent on average -- that is, below those that are usually supposed to convince us that the U.S. is too closed even to contemplate fixed exchange rates. What makes the matter even more perplexing is the fact that by fixing their exchange rates with one another, the EMS members do nothing to reduce the expected variability of their exchange rates vis-à-vis the rest of the world. On the contrary, they may increase this last variability. Furthermore, the possibility that they do so seems to be borne out by the view that many of the EMS currencies move more relative to the dollar than they would if they were not following the DM.

From the standpoint of the present analysis, however, the figures for total openness in column 2 are indeed the right ones. The more open a country, *all things considered*, the larger its optimal currency size. The numbers in column 3 are not even of any particular concern. What these values signify in our schema -- if only roughly -- is  $x$  times  $u$  (roughly because the actual composition of the EMS is not exactly the optimal one and the right weights for  $u$  are those concerning multilateral effective exchange rates). In a word, a low value of  $xu$  could simply indicate that a currency area is too small.

The present analysis also fits well with the contrasting behavior of many indices of real exchange rates: in particular, the tendency for narrower movement of relative export prices than broader indicators of these exchange rates like the relative prices of national output or national consumption. The lower variation of relative export prices clearly underlines the phenomenon of pass-through in individual markets, which accords well with our emphasis on the uneven capacity of the exchange rate to adjust home prices relative to different sets of foreign producers. Table 2 offers relevant evidence from the EMS which is drawn from Danthine *et al.* (1991). As can be seen, the relative prices of

exports in the sample are generally much more stable than those of production and consumption. This happens not to be true for Denmark, but is markedly so for France, West Germany and Italy.

That brings us back to the issue of asymmetric shocks which we raised at the start and calls up as well the need to refine our view of these shocks. The sorts of shocks which interfere with the net benefits of monetary union are plainly asymmetric. But not all asymmetric shocks argue against monetary union. Once we recognize the particular resemblance of a nation's exportables to those of some of its geographical neighbors as opposed to world competitors as a whole, we find that the class of situations where a country's output is generally mispriced looks much smaller. Of course, this is all the more true if we abstract, as we do now, from all of the causes of mispricing that issue from domestic monetary and wage policy. Consider a shock that depresses the British midlands, Belgium, northern France and northern Germany. The shock is plainly asymmetric; but there is limited scope for doing anything about it by altering exchange rates within the EC.

Not a word has been said thus far about the famous Mundellian criterion of labor mobility in defining an OCA. Upon reflection, the analysis is entirely compatible with total immobility of labor internationally. According to the reasoning, France could belong to an OCA traversing a number of frontiers that French workers will not cross. We are thus in stark conflict with Mundell's criterion. The question deserves close attention.

Let me suggest that Mundell's view belongs to the era of long run Phillips curves and should have been abandoned when this notion fell into disrepute in the early seventies. The issue is best analyzed by going back to Mundell's example of a shift of excess demand for goods from eastern Canada to the west coast of the country. If wages are downwardly rigid and monetary

policy stays the same, then given a concrete long run Phillips curve in the

relevant Phillips curve in Canada applies to the country as a whole, the unemployment in the East will eventually disappear. Mobility of labor between East and West will resolve the problem despite fixed exchange rates between East and West and downwardly inflexible money wages in the East. A zone of labor mobility -- that is, a surface over which a single long run Phillips curve applies -- might then very well seem to qualify as a criterion of an OCA. As a matter of fact, the appearance is deceptive since, as Mundell also emphasizes, a flexible exchange rate of the Canadian dollar can do nothing to smooth the adjustment to the particular shock he calls to mind. Unfortunately, the tension on this issue is never resolved in Mundell's classic paper. His concluding indictment of the Canadian experiment with flexible exchange rates would stand up just as well with complete immobility of labor between Canada and the U.S. My basic point, however, is that once we reject a long run tradeoff between unemployment and inflation and we insist instead on the flexibility of prices in the long run, Mundell's criterion of labor mobility loses practically all of its appeal.

In this case, regardless of labor mobility between eastern and western Canada, and regardless of a fixed or flexible east Canadian dollar relative to the west Canadian one, long run unemployment will be the same in both parts of the country. Therefore, the issue can only be one of the difference in the costs of adjustment with a fixed as opposed to a flexible exchange rate. Labor mobility will unambiguously improve the merit of a fixed rate. But so will capital mobility and any degree of price adjustment in the short run. The basic question therefore is one of the role of labor mobility in coming to an overall judgment about the best exchange rate system.<sup>(9)</sup> On this matter, the facts do little to buttress the post-Mundellian fascination with labor mobility. Wide and persistent regional differences in rates of unemployment exist in Western European countries: the United Kingdom, Italy and Spain in particular. Hall (1970, 1972) (and many others since him) pointed to major, long-lasting local disparities in rates of unemployment in the U.S. Eichengreen's (1990a) effort to check how much

faster labor responds to shocks in the U.S. as opposed to the EC would indicate that the differences are surprisingly modest. He finds "regional unemployment rates [to] adjust to one another about 20 percent more rapidly in the United States than national unemployment rates [do] in the EC" (1990c, p. 12). Based on all of this evidence, we should hardly wish to reduce the issue of the OCA to one of labor mobility.

Fiscal federalism is another big topic. Kenen observed in 1969 that in a country possessing a central fiscal authority, any jolts rocking a specific region will automatically give rise to some compensatory income movements from the rest through national taxes and transfer payments. For countries with central-government budgets of the size of the U.S., this mechanism appears to be extremely important. Sachs and Sala-i-Martin (1989) estimate that around 35 percent of any regional shock will be offset by the operation of federal taxes and expenditures in the U.S., three-quarters of the offset coming from the income tax, the rest from federal transfer payments. In more recent work, von Hagen (1991) finds the offset to be substantially smaller in case of transitory shocks. But he essentially confirms Sachs and Sala-i-Martin's results for shocks lasting at least a year or two. To all appearance, therefore, countries possessing a large national government budget are likely to constitute a single OCA, if only for this reason. In terms of the present analysis, Kenen's argument suggests, quite explicitly, that if we begin the interrogation with a region of a country, the marginal cost of u will be particularly low until the currency area attains the size of the entire nation, at which point the marginal cost will jump up. Why not then simply begin the analysis with the nation? In couching the discussion in terms of countries and possible associations between countries, I have implicitly leaned heavily on Kenen as well as domestic factor mobility.

However, most of the recent literature dealing with fiscal federalism in the context of monetary union goes much further: it suggests that a common

the same surface. Basing themselves on the American evidence in their study concerning the seventies and eighties, Sachs and Sala-i-Martin explicitly question the welfare ground for the EMU without the adoption of some degree of fiscal federalism.<sup>(10)</sup> There are a few essential problems with this view. The argument would imply that the U.S. itself was most likely not an optimal currency area even as recently as the thirties, since the federal income tax (which only became constitutional with the 16th amendment in 1909) remained relatively small in this country until the Great Depression, when unemployment compensation (at first state, later federal) and a federal system of social security first appeared.<sup>(11)</sup> Yet how much evidence is there of tension over monetary union in the U.S. prior to the development of a large federal tax-and-transfer system? And if the evidence is small or mixed, why does not the American example signify instead that monetary union can operate smoothly in an area exceeding an OCA? This question seems essential in drawing lessons from the American experience.

The overriding point, though, is that the present analysis clearly makes no particular demands about fiscal federalism -- any more than about international labor mobility. According to the reasoning, the EMU could be an OCA without any fiscal federalism. It might not be, in which case, of course, provisions for fiscal federalism could be a way nevertheless to make all the members better off. But any argument for fiscal federalism on this ground goes beyond the scope of this paper.

#### V. Conclusion

In closing, the level of abstraction in these pages deserves a special word. The only decision under discussion that any government can really take by itself is to peg its exchange rate to another currency or basket of currencies. Achieving an optimal zone of fixed exchange rates or an optimal currency area is therefore not an optimization exercise in the usual sense. It requires concertation. Furthermore, when the issue of an OCA does come up, the



possible membership will usually be delimited from the start, and non-monetary considerations will likely weigh heavily in the balance. Accordingly, if we go back to the beginning of the EC, we would surely not find that the next six countries admitted into the organization represented the optimal choice for the original six members -- certainly not on monetary grounds alone. As another example, the current centripetal forces operating in the Soviet Union are likely to call up the issue of the OCA in this vast territory. Among other things, the OCA in the USSR will tend to fall as the proportional significance of trade between the individual Soviet republics drops and the central government loses a lot of its revenue sources, thereby limiting the scope for any central system of taxes and transfers to absorb regional shocks. But whenever the question of monetary integration over a smaller geographical surface arises, the relevant membership will always be circumscribed and the criteria will never be strictly monetary.

Nevertheless, I believe that the recommended degree of abstraction -- in particular concerning the actual membership -- is a key to proper analysis. What I have tried to show is that many things fall into place if we take as our starting point any political unit that we will not consider breaking up into pieces, and then think in terms of the progressive enlargement of this currency area, picking from anywhere outside. The elusive notion that the vast majority of countries are too small to form an OCA by themselves becomes much easier to defend. The demands upon the nature of the shocks, labor mobility, and political organization seem less formidable than they often have in the past. There is a long history of marginal analysis in economics. The recommended degree of abstraction is essential to harvest the benefits of this type of analysis. In terms of concrete application, the argument is admittedly a far cry from resolving the question whether the EC is an OCA; but it is a step in that direction. On an even more positive note, though the argument may not tell us whether the Russian

republic is an OCA, it would strongly suggest that Georgia and Azerbaijan are

## FOOTNOTES

\*The author is in the research department of I.N.S.E.E. in Paris, professor at Hautes Études Commerciales, and a CEPR fellow.

1. For some important recent attempts to apply the theory of OCA's to the EC, see Eichengreen (1990a, c) and De Grauwe and Vanhaverbeke (1991).
2. The issue of monetary policy in currency unions has sometimes assumed large proportions in the literature. See particularly Fleming (1971) and Whitman (1972) (and for further examples, Tower and Willett (1976)). It should be observed, nonetheless, that the matter used to come up much more frequently when long run Phillips curve were fashionable and it was believed that countries could choose their unemployment over decades if only they were willing to accept the inflationary consequences of doing so.
3. The optimization exercise is special; I will come back to the issue at the very end.
4. It might seem that we should attach a different weight to the second term in expression (1) than the first one. But this is not clear since the same issue of sticky prices arises in both cases. I have also disregarded possible differences in the variance of (1) depending on the time horizon. As a final simplification, I made no mention of the covariance term.
5. And any attainable points interfering with the positive slope over small segments because of the "lumpiness" of the choices have been neglected.
6. See particularly the evidence in Robinson, Webb, and Townsend (1979) and Spitäller (1980). It is sometimes suggested that larger, less open economies have more to gain from exchange rate adjustment on the added ground that they face lower price elasticities of trade and therefore have more price and wage adjustment to avoid in equilibrating their trade (see, e.g., Krugman (1990), pp. 53-54). But the evidence does not bear out this last conjecture. Cross-country

elasticities of trade do not plainly vary by country size, openness or anything else. Some possible reasons can be inferred from Goldstein and Khan (1985). But see also a remarkable early paper by Orcutt (1955) (largely anticipating McKinnon's emphasis on openness). Further lacking adequate empirical support is Kenen's (1969) hypothesis that less developed countries have a higher interest in exchange rate flexibility because of their greater specialization (see Tower and Willett (1976), pp. 79-81 and the attached bibliography). In regard to Kenen's view, it is especially interesting to contemplate Johnson's ((1972), p. 206) diametrically opposite suggestion that so-called "banana republics" are those with the least to gain from flexible exchange rates (Mundell says about as much too in Mundell and Swoboda (1969), pp. 111-12).

7. The numbers simply require the right values of A and B. In general, the algebra means  $B > A$  or else no positive values of  $u$  would be optimal --  $u^*$  would be zero -- even if  $x$  were 100 percent. Therefore  $B > A$  or the algebra makes no sense. For  $A/Bx^2 < 1$ ,  $u^*$  still equals zero. Based on the intersection of  $C(u=0.05)$  and  $R(u=0.05)$  at  $x = 0.14$  in figure 2,  $A/B$  must equal  $(1 - 0.05)(0.14)^2$ , while figure 1 consequently demands the particular value of A which satisfies  $u^* = 0.50$  and  $x = 0.25$  for the previous ratio  $A/B$ . This is all intended to show that the algebra is adapted, nothing else.

8. Krugman (1990) relates these gains to questions of bounded rationality, thereby giving the whole subject a contemporary ring that resonates widely across the field of economics (and notably takes us away from the special assumption of "money illusion" in the labor force). I rely on him generally with respect to the character of the monetary advantages. The European Commission (1990) should not be overlooked either.

9. Ingram should be cited as a representative of the view that capital mobility may provide considerable support for an OCA quite apart from anything else.

See Ingram (1959, 1969).

10. See also Eichengreen (1990a, b, c). The European Commission seems to accept the view that dangers lurk in a European monetary union without some provisions for fiscal federalism (somewhat in contradiction with my earlier, simplified account of the Commission's position; see EC (1990), pp. 107, 168). Kenen, of course, offered some convincing examples of difficulties if a fiscal authority covers a different geographical surface than the monetary high command. But all of his examples concern instances where the fiscal authority faces a number of different regional central banks issuing separate currencies. He does not entertain the quite separate example of a single monetary authority facing many strong state governments and a weak or non-existent central one -- or the relevant case in this discussion and in the EC.

11. The ratios of federal taxes to GNP in the U.S. were between 3 and 6 percent throughout the thirties. By extension, Canada probably also did not constitute an OCA prior to the Second World War if we judge from Sachs and Sala-i-Martin.

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Table I: Measures of openness (1990)

	Import share of GNP	Net import share of GNP(a)	Net intra-EC import share of GNP(b)
	(1)	(2)	(3)
Belgium	73.1	42.4(c)	25.2(c)
Luxembourg	106.3		
Denmark	30.3	16.4	7.2
France	23.2	14.5	8.7
W. Germany	26.8	16.3	8.0
Greece	30.2	24.2	14.2
Ireland	56.3	38.5	23.7(d)
Italy	20.2	13.4	6.7
Netherlands	52.4	22.1	12.5
Portugal	46.8	28.5	17.5
Spain	21.8	16.9	8.0
United Kingdom	27.1	18.0	7.8
EC12 weighted mean	27.9	~17	~8.5-9
USA	11.2		
Japan	12.5		

Source: EC European Economy, December 1990, no. 46.

a. The net import share omits the import-content of exports from imports. The figures are calculated on the basis of net imports in 1985, the only year for which the right data are available (Drèze, Wyplosz, Bean, Giavazzi, and Giersch (1987), p. 23). I assume that the ratio of net imports to imports in 1990 was about the same as in 1985.

b. The assumption in the preceding footnote holds here as well, with the additional proviso that the ratio of net imports to imports in intra-EC trade is supposed to be the same as the one in overall EC trade.

c. The number pertains to Belgium-Luxembourg and is not otherwise available.

d. About half of this percentage is attributable to trade with the United Kingdom.



Table 2: Real effective exchange rates in 1989  
(1970-79 = 100)

	Relative export prices	Relative CPI's	Relative GDP deflators
Belgium	92.3	87.1	83.7
Denmark	92.4	101.7	96.6
Netherlands	94.7	96.0	92.8
France	99.3	94.3	93.7
West Germany	103.2	90.5	92.8
Italy	102.7	117.2	121.9
Spain	115.0	123.0	121.0

Source: Danthine, De Grauwe, Katseli, and Thygesen (1991).

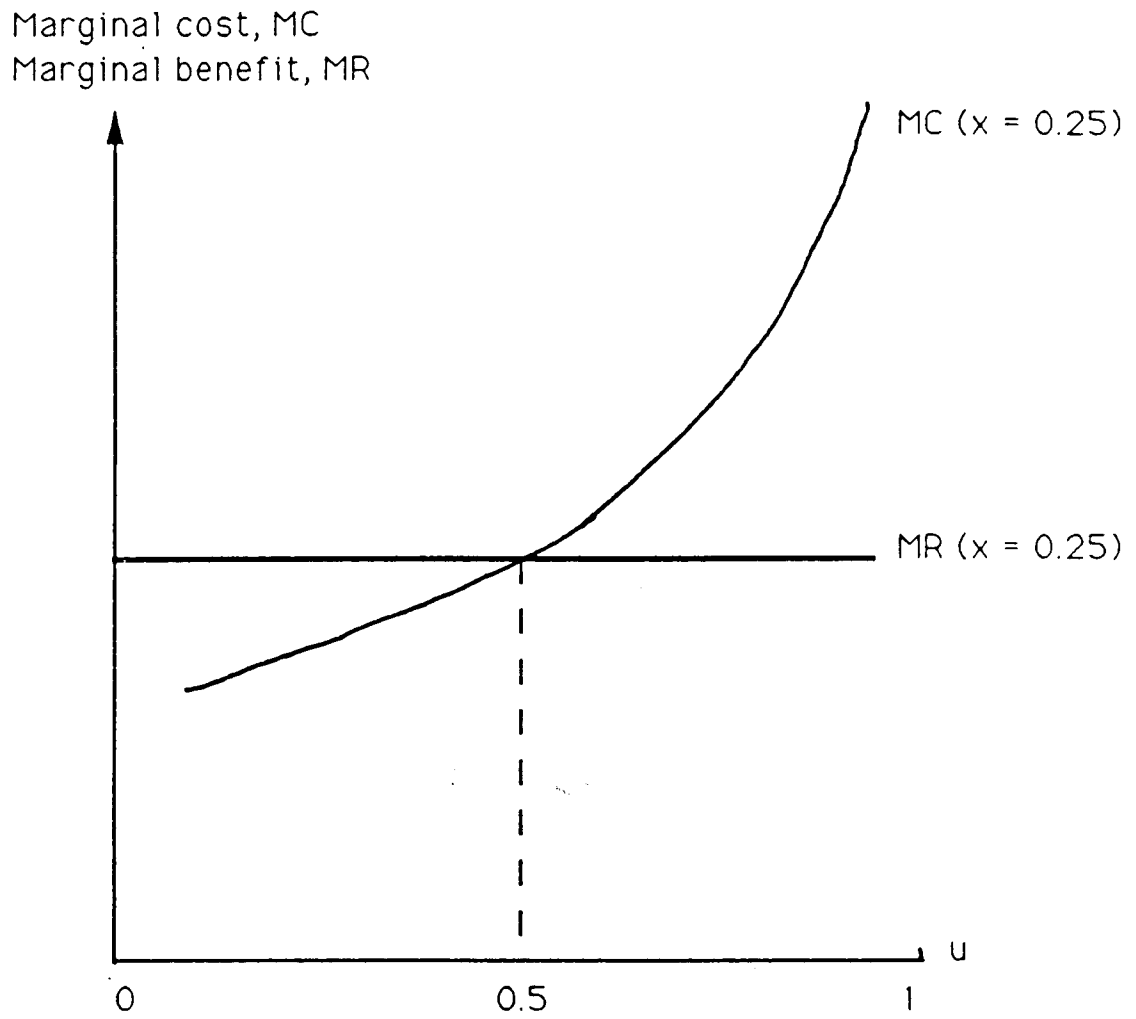


Figure 1

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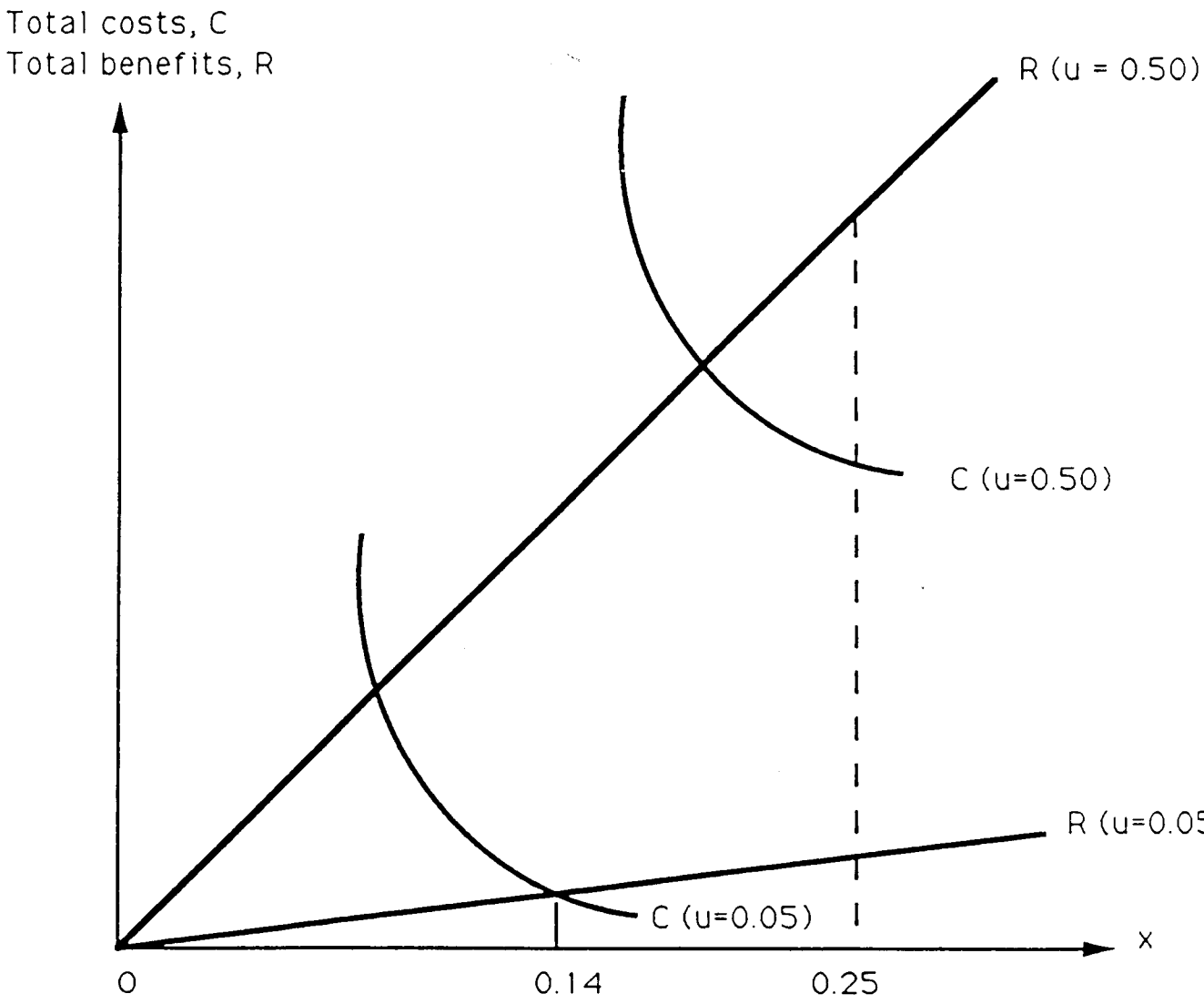


Figure 2

Marginal cost, MC  
Marginal benefit, MR

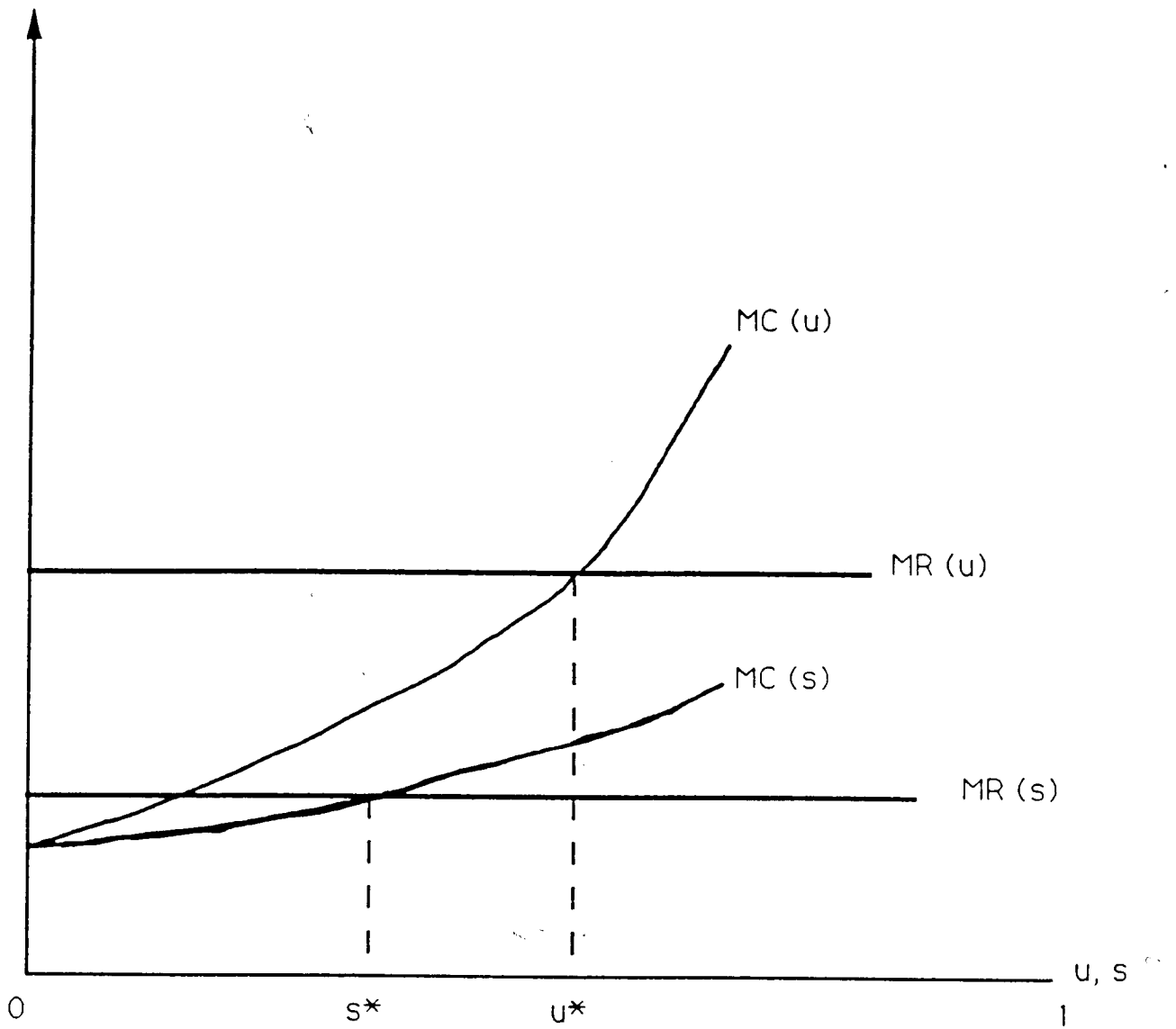


Figure 3

$$MC(u) = \frac{A}{(1-u)^2 x}$$

$$MC(s) = \frac{A}{(1-cs)^2 x}$$