DOCUMENTOS DE ECONOMIA Y FINANZAS INTERNACIONALES

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july 2001

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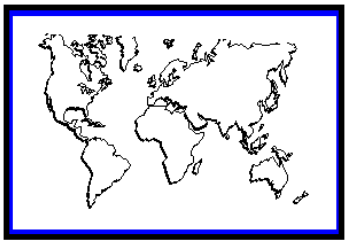

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INSURANCE MECHANISMS AGAINST ASYMMETRIC SHOCKS IN A MONETARY UNION: A PROPOSAL WITH AN APPLICATION TO EMU*

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Abstract

In this paper we propose a simple, automatic insurance mechanism designed to cope with asymmetric shocks in a monetary union, which could be used as starting point of a more elaborated policy instrument. The mechanism would use as indicator of the occurrence of a shock the changes in the unemployment rate of the countries belonging to the union, and would be financed through a fund built from contributions of these countries as a percentage of their tax receipts. The fund would be distributed among the countries affected by a negative asymmetric shock according to the proportion in which every one of them would have been affected by the shock. Our proposal is illustrated by means of an empirical application to the case of EMU.

Key words: Monetary union, asymmetric shocks, insurance function.

JEL classification: E62, E63.

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* The authors wish to thank the comments received from participants at the 6th World Congress of the Regional Science Association International (Lugano, May 2000), the International Symposium on Economic Modelling (Pamplona, June 2000), and, especially, an anonymous referee of this journal. Financial support from the Spanish Institute for Fiscal Studies and the Spanish Ministry of Education, through the Project PB98-0546-C02-01, is also gratefully acknowledged.

1. INTRODUCTION

Together with allocation (that is, supplying an adequate provision of public goods), redistribution and stabilization have been usually identified as the main functions of fiscal policy (see, e.g., Musgrave and Musgrave [1980]). The redistribution or equalization function is addressed to correct either structural disequilibria or those provoked by a shock (i.e., any unexpected event having a direct or indirect impact on the economy), where the concept of redistribution is related to those of interpersonal comparisons, equity, and economic and social cohesion. In turn, the stabilization function would be addressed to smooth the business cycle and so counteracting undesired fluctuations affecting the economy.

However, within the stabilization function, it is possible to distinguish the stabilization function in itself, from the insurance function of federal fiscal policy (Eichengreen [1993]). So, whereas the stabilization function would try to compensate the effects that several regions might suffer following a common (symmetric) shock, the insurance function would be relevant in the presence of country-specific (asymmetric) shocks. Hence, the crucial difference between the stabilization and insurance functions lies in the kind of shock to be offset: symmetric or asymmetric, respectively.

The central budget plays a key role in the redistribution among territories within a federation (that is, a territory made up of several federal states, each one formed by a certain number of local governments) (see von Hagen [1993]). Starting from a certain structure of revenues and expenditures, redistribution translates into an equalization function, since the existence of progressive taxes and uniformly distributed regional transfers, means that those regions (which can be extended to more than one state) with a lower level of income will receive transfers from the rest. But the central budget may also provide a stabilizing effect in an automatic way, through direct transfers and progressive taxes. So, in the case of all regions simultaneously experiencing a recession, tax revenues would decrease, and transfers would increase; this would be the stabilization function. However, when a region suffers a recession not affecting the others, net transfers of the central government to that region would increase; this would be the insurance function.

On the other hand, in the context of the Economic and Monetary Union (EMU) started by 11 member countries of the European Union (EU) in January 1st 1999, the management of fiscal policy becomes an issue of special relevance. The formation of a monetary union means that both the exchange rate *vis-à-vis* the other members of the union, and national monetary policies, disappear as independent policy instruments available to the authorities of the member countries of the union, which now share a common monetary policy. However, a common monetary policy cannot be the right answer faced to the occurrence of an asymmetric shock. As already stressed in Mundell's [1961] pioneering contribution to the theory of optimum currency areas, a common monetary policy cannot be different for different regions; and, if it responds to any asymmetric shock affecting to a particular region, the common monetary policy will necessarily hurt the other regions. All this calls for some other policy instrument to cope with asymmetric shocks. In this sense, the possibility of introducing a centralized fiscal policy instrument at the EU level, acting as an automatic mechanism to offset the asymmetric shocks eventually affecting to the countries or regions belonging to EMU, has been widely discussed in last years.

The analysis of such a mechanism will be the objective of this paper. In section 2, we will discuss the main questions raised in the literature on the degree of insurance provided by particular insurance mechanisms. In section 3, we will review the available evidence on the degree of insurance provided by the federal budget in actual fiscal federations. In section 4, we will offer a specific proposal of an automatic insurance mechanism designed to cope with asymmetric shocks in a monetary union. Finally, the main conclusions are presented in section 5.

2. THE INSURANCE FUNCTION OF FISCAL POLICY: THEORETICAL ISSUES

The proposal of providing some insurance to the regions experiencing asymmetric shocks in a monetary union, has a certain tradition within the classical literature on optimum currency areas (Kenen [1969]), although it has come back to the foreground with the publication of the paper of Sala-i-Martin and Sachs [1992].

First of all, if we assume as desirable an automatic insurance mechanism against shocks, the relevant concept of shock should be defined: asymmetric shocks, i.e., those requiring an optimal answer which is different in every country. In turn, two types of asymmetric shocks should be distinguished: specific, which affect just one country (i.e., asymmetric both in origin and in impact), and common to several countries but having a different impact on them (i.e., symmetric in origin but asymmetric in impact).

As is well known, joining EMU means the loss of the exchange rate and an independent monetary policy as instruments available to face any shock that might appear. However, the high degree of price and wage flexibility, as well as labour mobility, required to stand as alternative adjustment mechanisms, should not be expected to work in EMU, at least in the short run. This is particularly important if we assume that any country or region belonging to EMU can experience asymmetric shocks at any time, since a common monetary policy is not an appropriate instrument to face asymmetric shocks. And even a common monetary policy can lead to different effects on different countries or regions, depending on their initial conditions, and so becoming a source of asymmetries. Therefore, fiscal policy appears as a potential candidate to become the most important policy instrument to face asymmetric shocks.

In theory, under a federal fiscal authority most exogenous shocks affecting a monetary union would be automatically absorbed due to the effect of procyclical taxes and countercyclical expenditures. However, faced to EMU, the EU budget should not be expected to play the same role than, for instance, the US federal budget. In fact, proposing structural reforms of the budget would require several institutional changes, such as reinforcing the role of the European Parliament, creating either a supranational

authority on taxes or funds guaranteed by different budget rules, or establishing a joint decision mechanism for the coordination of fiscal policies.

Incorporating the insurance function to the EU budget would mean to reinforce fiscal competencies at the EU level, given that the size of its budget is still relatively small. However, the implementation of a European fiscal policy in this way would face a difficulty, since there are no federal taxes at the EU level, and shifting some taxes to the EU is not envisaged. Since the current structure of revenues and expenditures is not able to provide an automatic stabilization, the need of designing a specific mechanism has been discussed in the literature. This question, already noticed by Goodhart and Smith [1993], has been discussed in several studies trying to answer the question of how a stabilization policy at the European level might be designed and how the insurance function might be guaranteed. In the rest of this section we will review the main points raised in this literature, such as the degree of automaticity of the mechanism, the proper level of government involved, the equilibrium between redistribution and stabilization, and the origin and destination of the funds.

2. 1. Automaticity vs. discretionality

Italianer and Vanheukelen [1993] defend the existence of an insurance mechanism at the federal level, although they warn about the limited value of the US experience. Majocchi and Rey [1993] coincide with these authors in that resorting to transfers among governments would require a reform of the European fiscal system. Since this solution seems to be hardly feasible, they insist in that the alternative mechanism should operate in a discretional way, in order to be able to verify that the shock was exogenous and so avoiding problems of moral hazard. Italianer and Vanheukelen solve this question by proposing a limited stabilization mechanism which could be activated either automatically or discretionally, in the latter case if the government of the affected country must prove that the shock escapes to its control; this possibility takes advantage of fiscal autonomy, avoids moral hazard and guarantees the insurance's automaticity.

2. 2. National insurance vs. federal insurance

The basic question is not whether the federal budget is able to provide insurance (see the empirical evidence reviewed in the next section), but rather if the implementation of the insurance function should be done at the federal level. According to Mélitz and Vori [1993], the insurance function could help to overcome the loss of national independence in the management of macroeconomic policy, and should be instrumented at the national level. Indeed, they affirm that common shocks with asymmetric effects would not be a problem in Europe, so that the EU would be close to be an optimum currency area that would not require an insurance mechanism. However, the insurance function of fiscal policy at the federal level would be addressed to specific shocks affecting the domestic economy (Eichengreen [1993]). On the other hand, the objective of insurance is to cover oneself against a risk, and not necessarily to compensate the loss of independence regarding fiscal policy.

In a recent paper, Forni and Reichlin [2001] argue that a European-wide insurance mechanism would be more effective than a national one. The reason is simply that the former can potentially insurance both nation-specific and region-specific shocks, unlike the latter, which can only offset regional shocks. Since, according to their empirical results, national shocks account for a significant part of output fluctuations in the EMU area, the scope for a fiscal federation as an insurance mechanism would not be negligible.

2. 3. Redistribution vs. stabilization

Finding the equilibrium between redistribution and stabilization means a problem of political decision that also affect the features of the stabilization mechanism; indeed, not all the available studies clarify the basic difference between both functions. Italianer and Vanheukelen [1993] design a mechanism exclusively intended to accomplish the stabilization function, whereas von Hagen and Hammond [1998] propose a series of redistributive or stabilizing mechanisms according to different properties included in their design, concluding that, the higher the econometric complexity, the higher the degree of stabilization provided.

2. 4. Financing and destination of the funds

Both the financing of the mechanism and the destination of the funds are open questions, since the available studies limit themselves to point to certain general aspects on the design of the mechanism (what to insure?, whom?, desirable properties, indicators to use), as well as to simulate how some examples could work. Only Majocchi and Rey [1993] propose that their discretional mechanism would be financed in an *ad hoc* manner by the countries concerned, and that the amounts to be paid would be conditioned in order to assure its consistency with the Community's objectives. The rest of studies do not examine this issue, although they recognize that the degree of stabilization attained will depend, in part, on how the funds are used.

3. THE INSURANCE FUNCTION OF FISCAL POLICY: EMPIRICAL EVIDENCE

Several empirical studies have tried to quantify, from the experience of the actual fiscal federations, the degree of insurance that the federal budget can provide; however, not all of them make clear the difference between stabilization and redistribution, and most of them confuse the insurance and the stabilization functions. All these papers start from the same hypothesis: federal systems provide an insurance against shocks; next, they take as indicator of the occurrence of a shock the unfavourable evolution of a certain economic variable, and study the stabilizing properties of fiscal variables. The insurance effect is quantified by means of two alternative methods: (i) regression analysis, distinguishing between income before and after taxes; and (ii) simulations from macroeconomic models, making some assumptions on the properties of the fiscal system and the degree of economic integration. In the rest of this section we will provide a brief review of this literature; a more detailed account can be found in Bajo-Rubio and Díaz-Roldán [2001].

In general, the studies using regression analysis compute the contribution of fiscal variables (taxes and transfers) on a variable that proxies the current state of the economy (state income or product). The pioneering contribution here is that of Sala-i-Martin and Sachs [1992], who regress federal government's tax revenues and transfers on the final disposable income of 9 US regions for the period 1970-1988, with the variables measured in levels. From the estimated elasticities in both regressions, they obtain that the federal budget would absorb, through taxes and transfers, around 40% of the initial effect of a shock. However, these results were criticized on the grounds that, since variables were measured in levels, the authors were not able to distinguish between the insurance and redistribution functions.

In this way, when the variables in the regression are measured in first differences, von Hagen [1992] obtains, for the 51 states of the US and the period 1981-1986, an insurance effect of 10%. In turn, Goodhart and Smith [1993] obtain an effect of 11% when replying von Hagen's exercise for the US but excluding the major oil-producer states; these authors also analyze the cases of Canada for the period 1965-

1988, and the UK for the period 1983-1987, and find an insurance effect between 12 and 17%, and 21%, respectively. Finally, Bayoumi and Masson [1995] use variables in levels and in first differences (which allows them to quantify the effect of the redistribution and insurance functions, respectively) for 48 states of the US between 1969 and 1986, and for 10 Canadian provinces between 1965 and 1988, obtaining a degree of insurance of 30% in the US case and 17% in the Canadian case.

The second group of studies address the issue by means of simulations from macroeconomic models, rather than regression analysis. Pisani-Ferry, Italianer and Lescure [1993] try to measure the scope of the automatic stabilization (insurance) provided by the fiscal system, following the appearance of a shock. They obtain an effect of 17% in the US, 37% in France, and between 34 and 42% in Germany, depending on whether transfers among regions are included; from here, the authors conclude that EMU member states would not need a specific insurance mechanism. Goodhart and Smith [1993] also perform a simulation analysis, obtaining an effect of 34% for the case of the UK, and conclude that an adequate fiscal policy coordination would be enough in order to insurance the different economies against the occurrence of shocks.

As can be seen, there are strong discrepancies in the results obtained in the studies quoted above, which are summarized in Table 1. These discrepancies would be related to two aspects: the components of the stabilizing mechanism, and the magnitude of its effects.

[Insert Table 1]

Regarding the composition of the mechanism, according to Sala-i-Martin and Sachs, von Hagen, and Goodhart and Smith, the tax system provides the bulk of the stabilization; whereas Pisani-Ferry *et al*. stress the role of social security payments (neglected by von Hagen) and the unemployment benefit at the federal level, which does not exist in the US economy. In turn, Bayoumi and Masson go a step beyond and suggest that the approaches of both Sala-i-Martin and Sachs, and von Hagen,

overestimate the stabilizing effect of the tax system, since transfers would be the component with a greater role in stabilization.

Turning to the quantitative differences in results, in regression analyses these could be explained for two reasons: the sample period (the longer the period, better results) and the variables chosen. Sala-i-Martin and Sachs, and Bayoumi and Masson, use *per capita* income before taxes, whereas von Hagen, and Goodhart and Smith, use the gross state product, a wider measure of economic activity. Regarding the fiscal variable, all these studies consider basically taxes and transfers, excluding the unemployment benefit, which is not managed at the federal level; indeed, von Hagen also excludes social security, since he argues that it can redistribute income among regions along time. Maybe for this reason, as well as using a different functional form than Sala-i-Martin and Sachs, von Hagen's results were the most pessimistic of all.

As a preliminary conclusion, it could be said that, although federal systems can certainly provide insurance, the degree of fiscal federalism actually needed can be lower than previously thought. Sala-i-Martin and Sachs' results show an upward bias, since they overlap the redistribution and stabilization functions. This would be confirmed by von Hagen's weaker results, even though concluding from here that a monetary union can work without any insurance seems to be somewhat extreme. By reconsidering the results of both Sala-i-Martin and Sachs, and von Hagen, Goodhart and Smith suggest that fiscal federalism can provide a remarkable degree of insurance. However, since this result would have been obtained thanks to several budget items non transferable to the EU budget in the medium run, it might be inferred that, faced to EMU, the implementation of other mechanisms would be more advisable. On the other hand, Pisani-Ferry *et al*. show how the degree of stabilization provided by the US federal budget would be lower than for several European countries such as Germany and France, due to the fact that in the US there is no unemployment benefit at the federal level. This would favour keeping relatively independent fiscal policies in the EU, without being necessary either any budget reform or creating automatic mechanisms to implement the insurance function.

4. AN INSURANCE MECHANISM AGAINST ASYMMETRIC SHOCKS IN EMU

We have reviewed in the previous sections a number of studies that analyze, from a theoretical point of view, different mechanisms addressed to implement the insurance function in EMU; as well as the available empirical evidence on such mechanisms from the experience of the actual fiscal federations. In practice, the degree of coverage provided is an empirical question that would depend, in principle, on the characteristics of the mechanism. However, to the technical problems of design and implementation, we should add the political problem of its general acceptance.

4. 1. The main characteristics of the mechanism

Aside the legal bases underlying the correct working of the mechanism, the more relevant questions concerning its design would be the following.

4. 1. 1. Why an automatic mechanism?

Despite the increasing degree of integration among the European countries, the possibility that any country or region belonging to EMU might experience asymmetric shocks should not to be neglected. And, given the less than perfect working of market mechanisms (such as price and wage flexibility, and labour mobility), and the inadequacy of a common monetary policy to face asymmetric shocks, fiscal policy emerges as the natural candidate to cope with asymmetric shocks in EMU. Also, given the limits imposed to the use of fiscal policy by the Pact for Stability and Growth, and the available empirical evidence on the insurance role played by federal budgets in actual fiscal federations, an automatic mechanism would seem to be more feasible than a discretional device.

4. 1. 2. When should it work?

When the indicator of the occurrence of a shock is activated. Before defining such an indicator, its desirable properties should be stressed: it must be a measure both reliable and quickly available, and its fluctuations must provide some information on the cyclical behaviour of real output. In principle, we can choose the negative evolution of a cyclical indicator (output or employment level, rate of growth of the economy), relative

to the EU average. As in Italianer and Vanheukelen [1993], we will use the change in the unemployment rate, under the assumption that changes in that variable correspond with changes in the opposite sense in the economy's rate of growth. However, unlike these authors, we take *all* countries experiencing an increase in unemployment as eligible to receive funds from the insurance mechanism, provided that unemployment decreases in at least one country, irrespective of whether this increase was above or below EMU's average. This implies that those countries where unemployment is increasing but below EMU's average, are taken as being affected by a negative, not positive, asymmetric shock; which could be justified since these countries would be reluctant to be net contributors to the mechanism despite the fact that their unemployment rates had increased.

On the other hand, the choice of the unemployment rate can be justified on the grounds that it becomes available relatively easily and with a short time lag, both at the national and regional level; and is also available (unlike output measures) at a monthly frequency, more appropriate to reveal the appearance of a shock than, e.g., quarterly or annual frequencies. It is true, however, that the evolution of the rate of unemployment also reflects changes in the rate of activity, which is not directly related to the effect of a shock. Despite this disadvantage, given data availability, the unemployment rate seems to be the best candidate to become the indicator of the occurrence of a shock[1].

Finally, in order to eliminate any structural component, the unemployment rate should be measured as the deviation from its long-run trend.

4. 1. 3. How should it work?

Compensating in relative terms to those regions negatively affected by a shock. Following von Hagen and Hammond [1998], the desirable properties of an insurance mechanism would be: (i) *it must operate with simplicity*, both regarding its financing

[1] An anonymous referee suggested to us the use of employment, rather than unemployment, as the best indicator of the occurrence of a shock. Even though we agree with this opinion, we have not been able to find homogenous employment data for the EMU countries at a monthly frequency when performing our empirical example (see below). For this reason, we propose the rate of unemployment as the best indicator, unless homogenous employment data might become available in the future.

and the transfer of funds; (ii) *in an automatic way*, avoiding bureaucratic intervention to assure its correct working, and with expenditures having a specific purpose; (iii) *it must not lead to any redistribution in the long run*, so that the mechanism must be designed to face asymmetric shocks; (iv) *it must avoid moral hazard*, so that observable data should be used when defining the indicator of the occurrence of a shock, and transfers should be performed among governments (in order to avoid creating personal incentives); (v) *it must have a wide coverage and assure budget neutrality*, so that those regions not affected by the unfavourable shock must contribute relatively more, and only the regions affected must receive transfers; finally, (vi) *the whole amount collected must be fully distributed*, avoiding deficits or superavits in the mechanism.

4. 1. 4. How to finance it?

This is a fundamental question for the general acceptance of the mechanism, since the concerned countries will be reluctant to give up any competencies meaning a loss of political sovereignty or national autonomy. Given that developing a federal budget does not seem to be viable in the short or medium run, we will propose giving up a percentage of tax collections. In this way, those countries not suffering the unfavourable shock will contribute relatively more than those affected (since, when output decreases, so will do tax receipts).

4. 1. 5. Who should be the beneficiary?

There is a discussion in the literature about whether the beneficiary should be governments, or rather the individuals. Under the proposed mechanism, the ultimate beneficiary would be the individuals becoming unemployed every period under analysis (i.e., every month). That is, each country affected would receive from the federal authority a proportion over the total amount collected, according to the change in its unemployment rate, which the government of that country (or, alternatively, other lower levels of government) should ultimately distribute among those becoming unemployed during that month. In this way, automaticity would be warranted since revenues would have the specific purpose of subsidizing unemployment. Indeed, on insuring individuals and not governments, the problems arising when an asymmetric shock would affect to a region belonging to more than one country would be minimized (von Hagen [1993]).

4. 1. 6. Which will be the degree of insurance achieved?

This is an empirical question that would depend basically (i) on the concept of shock considered and on how its effects were measured; (ii) on the relative change in the indicator and its relation with the effects of the shock; and (iii) on the amount of the transfers received, and the way governments distribute them among individuals.

It should be stressed here that the proposed mechanism is designed to address strictly the insurance function, by transferring every period some income from countries where unemployment has decreased to those where unemployment has increased, *independently* of the initial level of unemployment in both types of countries. In other words, it is designed to offset an *increase* in unemployment (provided that unemployment has simultaneously decreased in at least another country), rather than *high levels* of unemployment; that is, the mechanism is not designed to correct unemployment, which should be addressed by other policy instruments, but to correct the effects of (asymmetric) shocks. This can lead, as in the example below, to the apparent paradox that the country with the highest rate of unemployment (Spain) would be a net contributor, at the same time that the country with the lowest rate of unemployment (Luxembourg) would be a net recipient.

4. 2. A proposal of an insurance mechanism for EMU

Now we will present a proposal of a specific and simple insurance mechanism against asymmetric shocks, designed to be applied to the countries participating in EMU. As indicator of the occurrence of a shock, we will use the change in the unemployment rate with respect to the period before:

$$du_i(m) = u_i(m) - u_i(m-12)$$

where $u_i(m)$ is the unemployment rate of country i ($i = 1,...,N$; being N the number of countries participating in EMU) in month m ($m = 1,...,12$), measured as its deviation from trend. Since in the numerical application we will use monthly data, the unemployment rate would be the best choice (despite the problems mentioned above) for the indicator of the shock, given the unavailability of monthly data for other possible candidates, such as GDP or employment. On the other hand, our indicator will refer to the change in the unemployment rate with respect to the same month of the year before, in order to eliminate the effect of seasonal factors.

The condition for a country h to receive payments will be:

$$du_h(m) > 0$$

provided that, in at least one country k:

$$du_k(m) < 0$$

where subscripts h and k denote the country negatively affected by the asymmetric shock, and that positively affected, respectively. In words, in month m, country h's unemployment rate must have increased compared to the same month of the year before, and at least one of the other countries must have registered a decrease in its unemployment rate during the same period.

It is important to stress that, if the unemployment rate would have increased in all the EMU countries simultaneously, the above condition would not be fulfilled, and no country would be eligible to receive funds from the mechanism. In other words, the unfavourable shock would have been symmetric rather than asymmetric, hence requiring stabilization instead of insurance.

As for the financing of the mechanism, we will assume that each country will give up a percentage of its tax collections. Since the latter are procyclical, those countries not suffering the unfavourable shock would contribute proportionally more than those affected. Denoting α that percentage (which will be assumed to be the same for all countries) and $T_i(m)$ the total amount collected in country i (i = 1,...,N) in month m, $\alpha T_i(m)$ will be the amount with which country i contributes every month m. In this way, the total amount of the fund to be distributed every month m will be given by:

$$F(m) = \alpha \sum_{i=1}^{N} T_i(m)$$

Finally, the total fund F(m) will be distributed among the countries concerned according to the proportion in which every country h (h = 1,...,H) was affected by the unfavourable shock, denoted by $\beta_h(m)$:

$$\beta_h(m) = \frac{\omega_h du_h(m)}{\sum_{h=1}^{H} \omega_h du_h(m)}$$

where ω_h represents the weight of the unemployment rate of country h in the unemployment rate in the whole EMU area (in the numerical application the weighting factor will be GDP), being H the number of countries affected by the unfavourable shock (0<H<N). We will also impose the constraint $\sum_{h=1}^{H} \beta_h(m) = 1$, which guarantees that the fund is fully distributed, so that we will eliminate the possibility of redistributive actions in the long run.

Therefore, each country h negatively affected by an asymmetric shock would receive every month m a total amount $B_h(m)$:

$$B_h(m) = \beta_h(m) F(m) = \frac{\omega_h du_h(m)}{\sum_{h=1}^{H} \omega_h du_h(m)} \alpha \sum_{i=1}^{N} T_i(m)$$

As can be seen in the previous expression, each country h negatively affected by an asymmetric shock would receive a higher amount the higher was $\beta_h(m)$, which would occur, on the one hand, the higher was the relative increase in its unemployment rate as compared to the other countries affected; and, on the other hand, the lower was the number of countries suffering that unfavourable shock. In other words, the proposed mechanism "stabilizes more" the more asymmetric was the shock, so that it would exclusively perform the insurance function.

4. 3. The insurance mechanism in practice: an application to EMU

Next, we will present a simple empirical application of the insurance mechanism proposed in the previous subsection. To this end, we will use monthly data for the 11 countries participating in EMU from its inception, and the reference year will be 1997[2].

The changes in the unemployment rate in every month of 1997 with respect to the same month of 1996, for each one of the 11 countries and the whole EMU area, are shown in Table 2. As can be seen, the only countries satisfying the requirements to

[2] The figures for Greece (which joined EMU in 2000) were not available in our data set of reference. Notice also that, in this empirical application, we use unemployment rates as they appear in our data set, given the lack of appropriate time series to compute deviations from trend.

benefit from the proposed mechanism (i.e., those experiencing an increase in their unemployment rates, provided that unemployment decreases in at least one country) would be Germany and Luxembourg, both of them during all the year; France, from January to July; Italy, from January to July, and from September to November; and Austria, in January and February, and from April to December.

[Insert Table 2]

The total amount of the fund to be distributed, computed from a percentage α given up by each country on its tax collections, is shown, for different values of α, in Table 3. When computing the fund, value added tax (VAT) collections in 1997 have been used. The choice of VAT might be justified on the grounds that this tax is subject to some harmonization principles within the EU; in fact, the quantitatively most important revenue source of the EU budget is given by the transfer of a percentage of VAT collections in each member state. Notice that, given the lack of homogeneous data on monthly VAT collections, we have assumed for simplicity that the amount collected every year is assigned in the same proportion every month[3].

[Insert Table 3]

Next, in Table 4 we show the proportions in which those countries satisfying the above requirements would receive payments from the insurance mechanism, where all the β's in each file add to one. As can be seen, these proportions would be higher, *cæteris paribus*, the higher the relative increase in the unemployment rate and the lower the number of countries concerned (or, in other words, the more asymmetric the shock). Also, given a same increase in the unemployment rate, those countries of a greater size would receive a higher share of the total fund; in our case, those countries with a higher GDP, since this has been the weighting factor used when computing the proportions β.

[Insert Table 4]

[3] The different figures every month appearing in Table 3 are due to exchange rate fluctuations, since the original figures were given in US dollars.

Once we know the total amount of the fund and how it will be distributed among the countries suffering the unfavourable shock, in Table 5 we present the monthly amounts to be received by each of these countries, for different values of α.

[Insert Table 5]

Finally, we have tried to measure the degree of coverage that the proposed insurance mechanism would provide. Notice that we do not intend here to offer an exact measurement of the effects associated with the mechanism, but rather a rough approximation through a very simple procedure. To this end, we have estimated, with annual data for the EMU-11 area during the period 1960-1996, the following equation representative of the so-called "Okun's Law":

$$du(t) = \gamma - \sigma\, g(t)$$

where du and g denote, respectively, the change in the unemployment rate and the rate of growth of real GDP, and t denotes a particular year.

From the estimation of the above equation, the rate of growth of any particular country (omitting country subscripts for simplicity) in the presence of a shock (i.e., when $du(t)\neq 0$) would be given by:

$$\hat{g}^{s}(t) = \frac{\gamma}{\sigma} - \frac{1}{\sigma} du(t)$$

and the associated GDP level by:

$$\hat{Y}^{s}(t) = \left[1 + \hat{g}^{s}(t)\right] Y(t-1)$$

where Y denotes GDP and superscript s means 'shock'. On the other hand, in the absence of a shock (i.e., when $du(t)=0$), the estimated rate of growth would be given by:

$$\hat{g}^{ns}(t) = \frac{\gamma}{\sigma}$$

and the associated GDP level by:

$$\hat{Y}^{ns}(t) = \left[1 + \hat{g}^{ns}(t)\right] Y(t-1)$$

where superscript ns means 'no shock'.

Therefore, the size of any shock on a particular country occurred in year t, could be proxied by:

$$\hat{Y}^{ns}(t) - \hat{Y}^{s}(t) = \left[\hat{g}^{ns}(t) - \hat{g}^{s}(t)\right] Y(t-1)$$

which, after replacing the expressions for $\hat{g}^{ns}(t)$ and $\hat{g}^{s}(t)$ above, can be written as:

$$\hat{Y}^{ns}(t) - \hat{Y}^{s}(t) = \left[\frac{1}{\sigma} du(t)\right] Y(t-1)$$

In this way, the degree of coverage of the insurance for country h in year t, would be given by the ratio of the sum of the payments received throughout the year to the size of the shock:

$$\frac{B_h(t)}{\hat{Y}_h^{ns}(t) - \hat{Y}_h^{s}(t)}$$

where

$$B_h(t) = \sum_{m=1}^{12} B_h(m) = \sum_{m=1}^{12} \left(\frac{\omega_h du_h(m)}{\sum_{h=1}^{H} \omega_h du_h(m)} \alpha \sum_{i=1}^{N} T_i(m) \right)$$

and

$$\hat{Y}_h^{ns}(t) - \hat{Y}_h^{s}(t) = \left[\frac{1}{\sigma} du_h(t)\right] Y_h(t-1)$$

The estimation of the Okun's Law equation for the EMU-11 area during the period 1960-1996, gave the following results (t-statistics in parentheses):

$$du(t) = 1.712 - 0.296\ g(t)$$
$$(6.834)(-7.563)$$

with $R^2 = 0.65$, and DW = 1.76; the estimated equation also included a time trend, with a negative and significant coefficient. In particular, the estimated coefficient for σ, 0.296, proved to be significant at the 1% level.

The results of applying the procedure sketched above appear in Table 6. The degree of coverage has been computed as the ratio of the total payments received from the mechanism throughout the year (i.e., the last line in tables 5A through 5E), to the size of the shock, the latter measured from the estimated coefficient for σ, the average increase in unemployment rates computed from Table 2, and the previous year's GDP of the countries involved.

[Insert Table 6]

As can be seen, the results in Table 6 lead to values for the degree of coverage of our insurance mechanism between 7 and 13% of the size of the shock, depending on the value of α. Notice that the higher degree of coverage enjoyed by France (and, to a lower extent, Italy) would be related to the shorter (7 months) but relatively strong unfavourable shock she had experienced; in other words, coverage would be higher the more asymmetric the shock. In general, the results obtained would be in line with those found in the empirical literature using regression methods (with the exception of Sala-i-Martin and Sachs), summarized in Table 1.

To conclude, notice that we have presented above the simplest version of an insurance mechanism. A possible extension, especially designed to try to avoid moral hazard problems (see below), would be to introduce a temporal limit to the reception of funds. For instance, we could assume that, for any country h receiving funds from the insurance mechanism during a certain number of months, there is a "threshold" so that this country receives next month just a percentage x_h ($0<x_h<1$) of β_h; a percentage which would decrease every month until reaching eventually the value zero. In this way, the corrected β for country h in month m, $\beta_h^c(m)$, would be:

$$\beta_h^c(m) = \beta_h(m)\, x_h(m) < \beta_h(m)$$

and, since the β's must add up to one, those countries satisfying the requirements to receive funds from the insurance mechanism but not reaching yet the "threshold", would receive a higher β. That is, if the number of "punished" countries is Q ($0 \leq Q < H$), the corrected β for any country j not reaching the "threshold" in month m, $\beta_j^c(m)$, would be:

$$\beta_j^c(m) = \beta_j(m) \left(\frac{1 - \sum_{h=1}^{Q} \beta_h^c(m)}{1 - \sum_{h=1}^{Q} \beta_h(m)} \right) > \beta_j(m)$$

for h = 1,...,Q; j = Q+1,...,H.

5. CONCLUSIONS

In this paper we have proposed an automatic insurance mechanism designed to cope with asymmetric shocks in a monetary union. The mechanism would use as indicator of the occurrence of a shock the changes in the unemployment rate of the countries belonging to the union, and would be financed through a fund built from contributions of these countries as a percentage of their tax receipts. The fund would be distributed among the countries affected by a negative asymmetric shock according to the proportion in which every one of them would have been affected by the shock.

Our proposal was illustrated by means of an empirical application to the case of EMU. As this example shows, the insurance mechanism proposed would lead to a higher stabilizing effect the more asymmetric was the shock (i.e., the higher would have been the relative increase in the unemployment rate and the lower the number of countries affected). Also, the total amount of the fund would be distributed (which would eliminate the possibility of redistributive effects in the long run), and all the participating countries (whether affected or not by the unfavourable shock) would contribute to the mechanism. Finally, we presented a rough estimation of the degree of coverage provided by the insurance mechanism, which would be in line with the figures previously found in the literature for the actual fiscal federations.

Some remarkable features of the insurance mechanism proposed in this paper are worthwhile to be stressed:

- First, since countries benefiting from the mechanism would be those experiencing *increases* in their unemployment rates when at least one of the other countries experiences a *decrease* in its unemployment rate (i.e., in the case of an *asymmetric* shock), the insurance function would be properly addressed. On the other hand, if the unemployment rate would have increased in all countries *simultaneously* (i.e., in the case of a *symmetric* shock), no country would be eligible to receive funds from the mechanism, and the adjustment to the shock should be made through the stabilization function; and the working of the mechanism would be independent of the *initial level* of unemployment, which should be rather addressed by the

equalization or redistribution function. In this way, no confusion with either the redistribution or the stabilization function of fiscal policy would appear, unlike previous studies on the subject.

- Second, our mechanism would be addressed to face *asymmetric* shocks. But this does not mean we are assuming that asymmetric shocks would necessarily prevail in EMU. In fact, this is an entirely empirical issue on which there is not concluding evidence in the literature, and even some authors have noticed that the greater integration associated with EMU would reinforce the symmetry of shocks affecting member countries (Frankel and Rose [1997]). Recent empirical work by Forni and Reichlin [2001] shows, however, that, although European-wide shocks would explain the bulk of output variance in EMU countries during the period 1980-1993 (around 50%), the role of both national and regional shocks would not be negligible, since they would explain the other 50%. In addition, a new source of asymmetric shocks is likely to appear in EMU, such as the asymmetric effects of the common monetary policy. Hence, asymmetric shocks are likely to appear in any circumstance, and an automatic insurance mechanism might be a helpful tool, specially following the disappearance of national monetary policy and the exchange rate as policy instruments available to the EMU countries' authorities.

- Third, it is obvious that the kind of mechanism proposed in this paper raises the problem of *moral hazard*, although a way to mitigate this issue has been sketched above, by introducing a temporal limit to the reception of funds. However, the need for an insurance mechanism against shocks has been widely discussed given the potential lack of suitable policy instruments against shocks following the formation of EMU, together with the limitations to the use of national fiscal policies imposed in the Pact for Stability and Growth. Is it really moral hazard more important here than for any other economic policy instrument?

Notice, first, that the main objective of the Pact for Stability and Growth is to prevent the risks of default and bailout in EMU, due to the potential indiscipline of national fiscal policies (Eichengreen and Wyplosz [1998]). This would imply that the provisions of the Pact would be a first control on the governments fiscal stance, which would work in order to relax moral hazard issues. On the other hand, from a theoretical point of view, Persson and Tabellini [1996] show that centralization of functions and power from the local to the federal level can be welfare improving under appropriate institutions, because it can offset the distortions in local government decisions created by moral hazard. And finally, from a more practical perspective, since the degree of coverage provided by the insurance mechanism should be designed to be relatively modest, this should contribute to additionally minimize moral hazard issues; in other words, the insurance mechanism should be designed as a help to those countries experiencing asymmetric shocks, rather than as a fully offsetting device. Hence, the previous arguments should contribute, in our view, to mitigate to a great extent the problem of moral hazard associated to an EMU-wide automatic insurance mechanism against asymmetric shocks.

- Finally, it should be noticed that, even though recognizing the usefulness of the insurance function, some authors (e.g., Mélitz and Vori [1993]) have proposed that this should be performed at the *national states' level*, rather than to the *EMU-wide level*. However, as argued by Forni and Reichlin [2001], given the non-negligible extent of national shocks affecting the EMU area (i.e., shocks that would be symmetric from a member country point of view, but asymmetric from EMU's perspective), a European-wide insurance mechanism would be more advisable than a national one. This result would mean an important argument to support an insurance mechanism performed at the EMU-wide level.

Summarizing, the mechanism proposed in this paper is intended to be a quite simple device, providing a significant coverage to those countries experiencing unfavourable asymmetric shocks in a monetary union, which could be used as starting point of a more elaborated policy instrument. On the other hand, we should recall that

the practical implementation of a mechanism of this kind is subject to the political problem of its general acceptance. In this sense, we find quite useful here Goodhart's argument that, once EMU is under way, "politicians and commentators will, rightly or wrongly, blame the severity of cyclical downturns on monetary union" (Goodhart [1995], p. 470). In this way, the availability of an EMU-level based automatic insurance mechanism could help to sustain political support for EMU in temporarily disadvantaged countries.

To conclude, notice that, in order to guarantee a better performance for an insurance mechanism such as the one proposed in this paper, it would be desirable to have better and homogeneous data on the different variables playing a role in the mechanism, for all the EMU countries. First, regarding the indicator of the occurrence of the shock, it would be convenient to have available a higher degree of harmonization in the definition of unemployment rates, or, alternatively, homogeneous monthly data on employment. In addition, a higher degree of fiscal harmonization for VAT (or the alternative tax figure to build the fund from), and the availability of homogeneous monthly data for tax collections would be also useful. Finally, it could be more appropriate, provided that data are available, designing the mechanism by looking at the regional economies level rather than national states', both for the definition of the shock and the distribution of the fund.

TABLE 1: Stabilization in federal fiscal systems

STUDIES	METHODS	SOURCE OF STABILIZATION	RESULTS
	REGRESSION		
Sala-i-Martin and Sachs [1992]	Variables in levels	Taxes	40% (US)
von Hagen [1992]	Variables in 1st differences	Taxes (excludes social security)	10% (US)
Goodhart and Smith [1993]	Variables in 1st differences	Taxes	11% (US) 12-17% (Canada) 21% (UK)
Bayoumi and Masson [1995]	Variables in 1st differences	Transfers	30% (US) 17% (Canada)
	SIMULATION		
Pisani-Ferry *et al.* [1993]	Two-sector model	Transfers, social security, unemployment benefit	17% (US) 37% (France) 34-42% (Germany)
Goodhart and Smith [1993]	IFS Tax and Benefit Model	Taxes	34% (UK)

Source: Bajo-Rubio and Díaz-Roldán [2001].

TABLE 2: Changes in the unemployment rate
(1997 to 1996)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Belgium	-0.8	-0.7	-0.7	-0.7	-0.5	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5
Germany	0.7	0.5	0.5	0.6	0.7	0.8	0.8	1.0	1.0	0.9	0.7	0.7
Spain	-1.4	-1.4	-1.6	-1.3	-1.2	-1.3	-1.4	-1.5	-1.5	-1.5	-1.5	-1.2
France	0.4	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	-0.1	-0.2
Ireland	-1.7	-1.9	-1.8	-2.2	-2.2	-2.3	-2.3	-2.4	-2.4	-2.2	-2.1	-2.0
Italy	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.2	0.2	0.1	-0.1
Luxembourg	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.5	0.4	0.3	0.1
Netherlands	-1.0	-1.1	-1.3	-1.4	-1.2	-1.0	-1.3	-1.5	-1.8	-1.7	-1.9	-1.8
Austria	0.3	0.2	0.0	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3
Portugal	-0.1	-0.1	-0.4	-0.7	-0.8	-0.6	-0.3	-0.5	-0.4	-0.4	-0.6	-0.6
Finland	-0.9	-0.4	-1.2	-0.6	-0.5	-1.8	-3.0	-3.1	-2.0	-2.0	-2.6	-2.4
EMU	0.1	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.1

Source: Eurostat: *Eurostatistics* 05/1997 and 05/1998; and *European Economy* 66/1998.

TABLE 3: Total fund to be distributed, for different values of α (in million Euro)

	Total VAT collections	α = 1%	α = 0.9%	α = 0.75%
January	42481.3159	424.813159	382.331843	318.609869
February	41315.8334	413.158334	371.842500	309.868750
March	41948.3800	419.483800	377.535420	314.612850
April	40560.6611	405.606611	365.045950	304.204958
May	40947.5970	409.475970	368.528373	307.106977
June	40512.1143	405.121143	364.609029	303.840857
July	38555.8586	385.558586	347.002727	289.168939
August	39156.4003	391.564003	352.407603	293.673003
September	39967.6711	399.676711	359.709040	299.757533
October	41125.6019	411.256019	370.130417	308.442014
November	40409.6267	404.096267	363.686640	303.072200
December	39538.6613	395.386613	355.847952	296.539960

Source: Own elaboration from OECD: *Main Economic Indicators*.

TABLE 4: Proportions for the distribution of payments

	$\beta_{GERMANY}$	β_{FRANCE}	β_{ITALY}	$\beta_{LUXEMBOURG}$	$\beta_{AUSTRIA}$
January	0.62597181	0.25616005	0.08696196	0.00416890	0.02673728
February	0.69789050	0.19991342	0.06786719	0.00650701	0.02782188
March	0.61218356	0.26304351	0.11906503	0.00570790	-
April	0.70167113	0.16749700	0.11372473	0.00545189	0.01165525
May	0.76382126	0.15628539	0.05305622	0.00508696	0.02175018
June	0.77941472	0.13954147	0.04737194	0.00454196	0.02912991
July	0.83719251	0.07494282	0.05088361	0.00569176	0.03128930
August	0.96659339	-	-	0.00450618	0.02890043
September	0.88414955	-	0.08598017	0.00343486	0.02643542
October	0.87357150	-	0.09439055	0.00301668	0.02902127
November	0.88515748	-	0.06148442	0.00294752	0.05041058
December	0.95801663	-	-	0.00106338	0.04091999

Source: Own elaboration from Table 2, and OECD: *National Accounts. Main Aggregates 1960-1997*, vol. 1, 1999.

TABLE 5: Monthly amounts to be received by each country, for different values of α (in million Euro)

Table 5.A: GERMANY

	α = 1%	α = 0.9%	α = 0.75%
January	265.921063	239.328957	199.440797
February	288.339274	259.505347	216.254456
March	256.801087	231.120979	192.600815
April	284.602450	256.142205	213.451837
May	312.766450	281.489805	234.574837
June	315.757384	284.181646	236.818038
July	322.786761	290.508085	242.090071
August	378.483179	340.634861	283.862384
September	353.373985	318.036586	265.030489
October	359.261537	323.335384	269.446153
November	357.688832	321.919949	268.266624
December	378.786952	340.908257	284.090214
TOTAL	3874.56895	3487.11206	2905.92672

Table 5.B: FRANCE

	α = 1%	α = 0.9%	α = 0.75%
January	108.820162	97.9381455	81.6151213
February	82.5958962	74.3363066	61.9469221
March	110.342491	99.3082423	82.7568686
April	67.9378903	61.1441013	50.9534178
May	63.9951105	57.5955994	47.9963329
June	56.5311996	50.8780797	42.3983997
July	28.8948474	26.0053626	21.6711355
August	-	-	-
September	-	-	-
October	-	-	-
November	-	-	-
December	-	-	-
TOTAL	519.117597	467.205837	389.338198

Table 5.C: ITALY

	$\alpha = 1\%$	$\alpha = 0.9\%$	$\alpha = 0.75\%$
January	36.9425836	33.2483252	27.7069377
February	28.0398940	25.2359046	21.0299205
March	49.9458513	44.9512662	37.4593885
April	46.1275035	41.5147531	34.5956276
May	21.7252454	19.5527209	16.2939341
June	19.1913753	17.2722378	14.3935315
July	19.6186129	17.6567516	14.7139597
August	-	-	-
September	34.3642714	30.9278443	25.7732035
October	38.8186816	34.9368134	29.1140112
November	24.8456241	22.3610617	18.6342181
December	-	-	-
TOTAL	319.619643	287.657679	239.714732

Table 5.D: LUXEMBOURG

	$\alpha = 1\%$	$\alpha = 0.9\%$	$\alpha = 0.75\%$
January	1.77100235	1.59390211	1.32825176
February	2.68842692	2.41958423	2.01632019
March	2.39437017	2.15493315	1.79577763
April	2.21132117	1.99018905	1.65849087
May	2.08298700	1.87468830	1.56224025
June	1.84004298	1.65603868	1.38003224
July	2.19450693	1.97505623	1.64588019
August	1.76445677	1.58801109	1.32334257
September	1.37283318	1.23554986	1.02962488
October	1.24062747	1.11656473	0.93047061
November	1.19108234	1.07197410	0.89331175
December	0.42044594	0.37840134	0.31533445
TOTAL	21.1721032	19.0548929	15.8790774

Table 5.E: AUSTRIA

	$\alpha = 1\%$	$\alpha = 0.9\%$	$\alpha = 0.75\%$
January	11.3583481	10.2225133	8.51876108
February	11.4948422	10.3453580	8.62113166
March	-	-	-
April	4.72744631	4.25470168	3.54558474
May	8.90617732	8.01555959	6.67963299
June	11.8011412	10.6210270	8.85085587
July	12.0638576	10.8574719	9.04789323
August	11.3163679	10.1847311	8.48727594
September	10.5656215	9.50905939	7.92421616
October	11.9351723	10.7416550	8.95137919
November	20.3707282	18.3336554	15.2780461
December	16.1792150	14.5612935	12.1344113
TOTAL	130.718918	117.647026	98.0391883

Source: Own elaboration from tables 3 and 4.

TABLE 6: Annual coverage provided by the insurance mechanism, for different values of α
(in percentage of the size of the shock)

	Germany	France	Italy	Luxembourg	Austria
$\alpha = 1\%$	10.21	13.11	11.06	10.15	10.22
$\alpha = 0.9\%$	9.19	11.80	9.95	9.14	9.20
$\alpha = 0.75\%$	7.66	9.83	8.29	7.62	7.67

Source: Own elaboration from tables 2 and 5, and Eurostat: *European Economy* 6/1998.

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