No. 2119

AN OPTIMAL CURRENCY AREA PERSPECTIVE OF THE EU ENLARGEMENT TO THE CEECS

Laurence Boone and Mathilde Maurel

TRANSITION ECONOMICS

Centre for Economic Policy Research

ISSN 0265-8003

AN OPTIMAL CURRENCY AREA PERSPECTIVE OF THE EU ENLARGEMENT TO THE CEECS

Laurence Boone and Mathilde Maurel

Discussion Paper No.2119
March 1999

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: http://www.cepr.org

CEPR Discussion Paper No. 2119

March 1999

ABSTRACT

An Optimal Currency Area Perspective of the EU Enlargement to the CEECs*

This paper tries to assess whether it would be optimal for the CEECs to form a monetary union with either Germany or the EU. This cannot be done without discussing first the Maastricht criteria, which are the condition 'sine qua non' for a country to be eligible. Yet, they are often independent from more structural criteria (Bayoumi and Eichengreen (1996b)). Hence, this paper argues that although the CEECs do not satisfy -yet- the Maastricht criteria, their economic cycle is close enough to that of the EU and Germany for a monetary union to bring them great benefits. Indeed, using a methodology derived by L. Reichlin and M. Forni (1997) and C. Fuss (1997), it can be shown that (i) the percentage of CEECs business cycle fluctuations explained by a German shock is very high,; (ii) furthermore, the impulse responses are positively correlated. These suggest that the CEECs would not suffer from a common monetary policy .

JEL Classification: E32, F3, F42
Keywords:optimal currency area, eastern enlargement, economics of transition

Laurence Boone
OECD
2 rue André Pascal
75775 Paris Cédex 16
FRANCE
Tel: (33 1) 45 24 14 73
Fax: (33 1) 45 24 90 50
Email: laurence.boone@oecd.org

Mathilde Maurel
ROSES (CNRS)
Maison des Sciences Economiques
Université de Paris 1
106–112 Boulevard de l'Hôpital
75013 Paris
FRANCE
Tel: (33 1) 55 43 41 88/9
Fax: (33 1) 55 43 41 91
Email: maurelm@univ-paris1.fr

*The authors are grateful to Catherine Fuss (OFCE) for her helpful comments and suggestions. This work was realised while Boone was an economist at CEPII.

Submitted 25 February 1999

NON-TECHNICAL SUMMARY

The costs and benefits of monetary union in Europe have been assessed using two main types of criteria: institutional (the Maastricht criteria) and those derived from the Optimal Currency Area (OCA) theory (see Bayoumi and Eichengreen (1996a), Demertzis *et al.* (1998) and Boone (1997)). Both sets of criteria should be analysed to assess the costs and benefits, for the CEECs, of pegging their currency to the Euro. Indeed, von Hagen (1996) argues that the first criteria will be required by the EU as a prerequisite to benefit from some of the funds; the second criteria allows the EU to see whether forgoing the exchange rate as an adjustment tool to a shock is too costly for the interested countries. A previous paper, Boone and Maurel (1998), examined how the Czech Republic, Hungary, Poland, the Slovak Republic and Slovenia on the one hand, and Bulgaria and Romania on the other hand, performed with respect to these criteria.

This paper argues that the similarity of the business cycle between the countries pegging their currency is a more relevant criterion. Two reasons support this view. First, as for France and some other countries, the Maastricht criteria may be at odds with the cost implied by a common currency (Bayoumi and Eichengreen (1996b)). Second, during the transition process there are specific sources of inflation, interest and exchange rates instability, which are less related to the cost of adopting a common monetary policy and may explain the current failure to fully satisfy the Maastricht criteria. A more important worry should be whether business cycle fluctuations are close enough, so that a common monetary policy does not prevent the success of structural reforms, but rather accompanies it, by favouring the emergence of a sound macroeconomic environment. This paper analyses the similarity of the CEECs business cycles to identify those countries that would not suffer, from this point of view, from having a monetary union. Two criteria are used: (i) the percentage of domestic business cycles explained by a common German or EU shock and (ii) the correlation of the domestic impulse responses to this shock with the EU member countries' impulse responses. With respect to these criteria, the CEECs cycle appears strongly correlated with the German cycle.

1. Introduction

The costs and benefits of monetary union in Europe have been assessed with two main types of criteria : institutional (the Maastricht criteria), and those derived from the Optimal Currency Area (OCA thereafter) theory (see Bayoumi and Eichengreen (1996a), Demertzis and alii (1998), and Boone, (1997)). Both sets of criteria should be analysed to assess the costs and benefits, for the CEECs, of pegging their currency to the Euro. Indeed, von Hagen (1996) argue that the first ones will be required by the EU as a prerequisite to benefit from some of the funds; the second allows to see whether foregoing the exchange rate as an adjustment tool to a shock is not too costly for the countries of interest. A previous paper, Boone and Maurel (1998), examined how Hungary, the Czech Republic, the Slovak Republic, Slovenia and Poland on the one hand, and Bulgaria and Romania on the other hand, performed with respect to these criteria.

This paper argues that the similarity of the business cycle between the countries pegging their currency is a more relevant criterion. Two reasons support this view. First, as for France and some other countries, the Maastricht criteria may be at odd with the cost implied by a common currency (Bayoumi and Eichengreen (1996b)). This might not be the case in Central Eastern Europe, where countries which satisfy more closely the Maastricht criteria have also much more converged in term of GDP per head than countries which failed to stabilise. Secondly during the transition process there are specific sources of inflation, interest, and exchange rates instability, which are less related to the cost of adopting a common monetary policy and may explain the current failure to fully satisfy the Maastricht criteria. A more important worry should be whether business cycle fluctuations are close enough, so that a common monetary policy does not prevent the success of structural reforms, but rather accompanies it, by favouring the emergence of a sound macro-economic environment. This aspect of the EU enlargement is assessed in this paper which focuses on business cycle analysis, and form clusters of similar countries having interest in forming a monetary union. Two criteria are used: (i) the percent of domestic business cycles explained by a common German or EU shock, (ii) the correlation of the domestic impulse responses to this shock with the EU member countries impulse responses. With respect to these criteria, the CEECs cycle appear strongly correlated with the German cycle.

2. The Maastricht criteria

Maastricht criteria were designed for selecting the EU countries that could join the EMU. Their declared aim[2] is to assess convergence in both nominal and fiscal terms. It is primarily a way to ensure

[2] Currie, 1997, pp. 28.

that both monetary and fiscal policy converge. Regarding monetary policy, inflation should be low, as a necessary condition for a « sound macro-economic environment »; similarly the exchange rate should be stable, and nominal interest rates should converge towards low levels. More formally, the criteria for nominal convergence are that a country must have an inflation rate within 1,5% (for the past two years) of the average inflation rate of the three countries with the lowest inflation rates; and a long run bond yield within 2% of the average long bond yield of the same three countries. Furthermore, the exchange rate must have been stable within the 15% ERM bounds for at least two years. Regarding fiscal policy, the aim is to achieve a budget surplus; in any case the budget deficit should be no higher than 3% of GDP (and on a declining trend). Public debt should also be limited to 60% of GDP and diminishing. The aim is to ensure a sustainable path for public debt, and to limit the public deficit so that interest rates do not rise to painful levels.

The patterns of inflation rates, interest rates, and exchange rates in the CEECs have been shown in Boone and Maurel (1998) to be on a declining trend, though not yet reaching levels compatible with the Maastricht criteria. Starting from Bayoumi and Eichengreen (1996b), who show that the Maastricht criteria do not ensure real convergence : « The most striking result is that our analysis places France in the group of countries for whom there is little evidence of convergence, despite its recent history of low exchange rate variability vis-a-vis Germany », this paper shows that they might be even less relevant for the CEECs.

Table 1 : Maastricht and Bayoumi and Eichengreen OCA criteria, 1995

	Bayoumi and Eichengreen OCA index versus Germany in 1995	Debt (per cent of GDP)	Deficit (per cent of GDP)	Inflation in 1995	Interest rates in 1995
France	0,074	51,5%	5%	1,9	7,6
Italy	0,059	124,9%	7,4%	5,6	11,8
Ireland	0,021	85,9%	2,7%	2,5	8,3
Portugal	0,062	70,5%	5,4%	4,2	11,7
Spain	0,073	64,8%	5,9%	4,9	10,9

Source : Boone and Maurel (1998, table 1), Bayoumi and Eichengreen (1996b, table 1). The higher the OCA index, the higher the variability of real exchange rates between country i and Germany, hence the lower the capacity of this country to support stable exchange rate in the future.

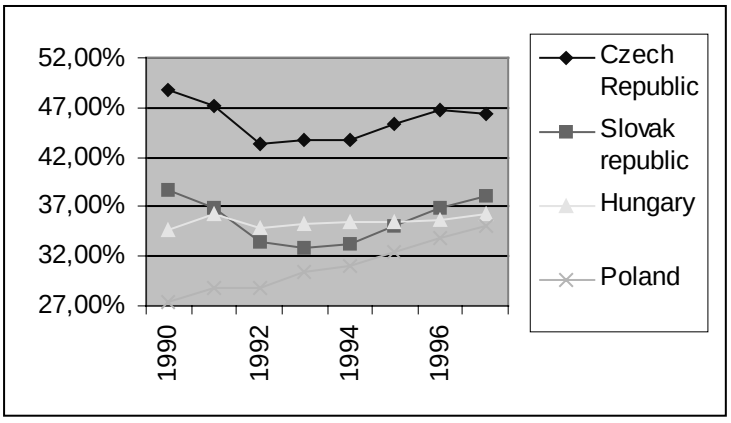
This table shows that France, which exhibits the highest OCA index, is also one of the most successful country in fulfilling the Maastricht criteria : it has the lowest inflation and interest rates, as well as the lowest debt in per cent of GDP. From that, Bayoumi and Eichengreen (1996b) conclude that France is less able to support stable exchange rates in the future, than other countries such as Austria, Belgium, and the Netherlands, which turn out to be prime candidates for EMU**.** Hence, not

only are the Maastricht criteria irrelevant for assessing the costs and benefits of joining a monetary union, but the OCA criteria would also appear to be so. This crucially highlights the need of assessing the similarity in business cycles with another methodology, which is done below.

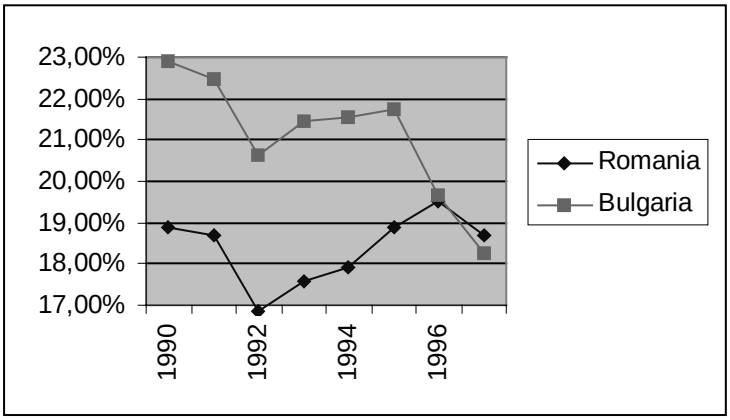
In the case of CEECs countries, which are still in transition, the Maastricht criteria cannot be assessed in the same way. A particularly important question in this respect is whether the achievement of low inflation has been governed by the adjustment of relative prices, a necessary aspect of the transition to a market economy, or whether inflation in these economies results only from the traditional factors of insufficiently tight fiscal policies and wage pressures. Both elements are present for the CEECs[3], but once the transition process is achieved, one can expect the price level, and subsequently the exchange rates and nominal interest rates, to be more stable.

Furthermore, while for the EU countries institutional and convergence criteria may be at odd, for the CEECs they are going in the same direction. Two groups of countries may be distinguished: Hungary, Poland, Czech Republic and Slovak Republic, Slovenia on the one hand, and Bulgaria, Romania on the other hand. The former have achieved in some cases single digit inflation rates, and reduced the public expenditures to levels compatible with the Maastricht criteria, while the latter are still experiencing hyperinflation processes (see Maurel and Boone, 1998). If we consider the evolution of GDP per head on a PPP basis in percent of that of Germany, the first group is clearly converging towards Germany, while the second group is characterised by a more unstable picture, as shown in the following two figures :

Figures 1 and 1bis: CEECs GDP in per cent of German GDP per year



[3] See Sharmini Coorey, Mauro Mecagni, and Erik Offerdal (1997).



Source : Chelem-CEPII, authors computation

These figures are reinforced by the Sigma -convergence indicator, which measures the cross-country evolution of the dispersion of GDP per capita across countries. It is a very intuitive measure of convergence, as a persistent increase in the variability is a sign of divergence, *and vice et versa*[4].

Table 2 : Variability in the following area per year

Years	Across CEECs	Across CEECs and aggregate EU	Across Central European countries* and aggregate EU	Across Bulgaria, Romania, and aggregate EU
1990	0,123	0,263	0,195	0,696
1991	0,119	0,291	0,217	0,809
1992	0,125	0,316	0,226	0,900
1993	0,113	0 ,302	0,221	0,866
1994	0,111	0,297	0,216	0,853
1995	0,109	0,286	0,204	0,822
1996	0,129	0,300	0,192	0,857
1997	0,155	0,325	0,182	0,921

*: Central European Countries include : Hungary, Poland, Czech Republic and Slovak Republic, Slovenia. Source : Chelem-CEPII, authors calculations. The figures are the variance of the logarithm of GDP on a PPP basis.

Table 2 shows that while Central Eastern European countries converge towards aggregate EU, there are no signs of such a convergence process for Bulgaria and Romania, which failed to stabilise. The absence of any convergence process in the first column is due to the heterogeneity of the sample, which does not distinguish countries, which converge towards the Maastricht criteria from those, which do not.

[4] A country is said to sigma-converge towards another if $V_{iT} > V_{i,0}$, where V_{iT} is the variance of GDP in the last period (1997) and $V_{i,0}$ the variance of GDP in the first period (1990).

However, as mentioned before, Maastricht criteria are not a tool for assessing real convergence. The issue is indeed controversial : for some authors, too strict an interpretation of the Maastricht criteria could be counterproductive. As argued in Coricelli (1996) for instance, the CEECs need fiscal resources to stimulate economic growth, and accelerate the reform process; for Andreff (1998), the economic-policy recommendations derived from the Maastricht criteria are likely to keep the CEECs in recession, thus widening the gap in GDP per capita, and the required transfers of funds from rich to poor members. But Oleh Havrylyshyn, Ivailo Izvorski, and Ron van Roodem (1998) have found that along with macro-economic stabilisation and structural reforms, reduction of public expenditures is key to achieve sustainable growth.

Beyond that, the most crucial issue is whether the CEECs are likely to benefit from sharing a common currency. There are several arguments, which favour such a strategy of CEECs deeper integration into the EU. First, sharp and unexpected fluctuations on the financial markets would vanish, and the restructuring process would benefit from a reduced risk premium, while changes in relative prices could still occur through trade specialisation. Second, small open countries should benefit a lot from the unit of account, means of payment, and store of value services provided by an international currency. Table 3 shows how small the CEECs are, and how large their respective degree of openness is:

Table 3: Size and degree of openness of the CEECs

	(Export+Import)/GDP		GDP per capita (dollars)		Population (millions)	
	1990	1996	1990	1996	1990	1996
Poland	25,38%	35,65%	2037	3459	38,3	38,6
Czech Rep.	67,32%	89,81%	2466	5340	10,3	10,3
Hungary	55,10%	69,75%	3242	4357	10,3	10,2
Slovak Rep	99,52%*	105,82%	2258	3525	5,3	5,3

Sources : EBRD Transition Report (1997). *This figure corresponds to 1993.

Third the process of transition has been characterised by a significant increase in the degree of openness, and by a trade reorientation, which places the EU countries at the head of the CEECs trade partners**.** As argued in Bénassy-Quéré and A. Lahrèche-Révil (1998), the implied geographical composition of trade is a strong argument for pegging the CEECs currencies to the Euro.

What are now the costs implied by either pegging a currency or sharing a common currency [5]? Assuming that the inflation rate in the transitional economies is the result of both the adjustment of relative prices and insufficiently tight financial policies, emphasises that the adoption of a common monetary policy will deprive the CEECs from a tool for accommodating demand shocks. So if the shocks are asymmetric, foregoing the domestic currency or pegging it to the Euro may be very costly. It is therefore crucial to evaluate the similarity of business cycles, the behaviour of the economies when faced with a shock and the responses to a policy aiming at adjusting the shocks. That is what the next section examines.

3. Assessing the similarity of business cycles

For assessing the cost of pegging the currencies (or sharing a common currency), we look at the degree of (a)symmetry of business cycles fluctuations between potential Eastern European candidates and EU member countries. We are aware that our measure of (a)symmetry partially reflects the fact that CEECs countries have already pegged their currencies to a basket of European currencies. Indeed, the business cycles fluctuations are likely to be more symmetric when the currencies are pegged, because there is already a common monetary policy[6]. Conversely, signs of diverging fluctuations should be worrying for the prospects of a common currency. That is what we assess in the following section.

3.1 Method and data

The data are the monthly unemployment rates from 1991 to 1997 (FERII database), which are chosen as a proxy to economic activity. The GDP is not available on a monthly basis for every country, especially for the CEECs, while industrial production numbers are far too noisy for this type of analysis. The sample includes Germany, Portugal, Spain, France, Italy, the Czech Republic, the Slovak Republic, Hungary, Poland, and the aggregate EU. Assuming that monetary policy acts primarily to smooth the business cycle fluctuations, the time series are decomposed into their cyclical and trend components. The latter is a long term component that is supposed to be more dependant on structural policies, while the former is correlated with demand shocks, which are not expected to have a permanent effect on output nor, therefore, on unemployment (see Bayoumi and Eichengreen, 1993). The time span of our data does not allow robust testing of the time properties of the series (to test whether they are I(0), difference-stationary or trend stationary), therefore we use the usual Hodrick

[5] Most countries in CEECs have already pegged their currencies to a basket of European currencies. For some of them, the next step is explicitly to join the euro-zone : the Hungarian Central Bank anticipates that Hungary will be able to join the EU in 2002, and the EMU at least two years later, while Slovenia would like to join the EMU in 2007-2008 : see P. Backé and O. Radzyner (1998).

[6] This argument is similar to that developed in Frankel and Rose (1996), who argue that the European integration should increase the symmetry of shocks.

Prescott filter to detrend the series, even though we are perfectly aware of all the drawbacks involved (see Boone and Hall, 1998).

The aim is to see how much of the CEECs business cycles, as reflected in the unemployment fluctuations (UF thereafter), is explained by a "common shock", which will be assumed to be either a German or a EU shock[7], (ii) to what extent the CEECs impulse responses to this common shock and EU member countries impulse responses are similar. The method followed here is inspired from M. Forni and L. Reichlin (1997) and C. Fuss (1997). It consists in two main steps. First, the "common shock" is identified and characterised; then the business cycle fluctuations of each country wishing to peg its currency is regressed on this common shock, in order to assess how much of the business cycle of this country may be explained by the common fluctuations.

3.1.1 Identifying the common shock

Two "common shocks" are used here : a shock that would be European-wide, and a German shock. This is done by fitting an ARMA (p,q) process to the German (EU) unemployment fluctuations series. More formally:

$$u_{i,t} = \sum_{j=1}^{p} a_j u_{i,t-j} + \sum_{j=0}^{q} b_j \varepsilon_{i,t-j} \qquad (1),$$

where $u_{i,t}$ represents the UF, and i stands for Germany or EU. The shock $s_{i,t}$ that affects Germany or the EU is the residual $s_{i,t} = \sum_{j=0}^{q} b_j \varepsilon_{i,t-j}$ of the identified ARMA(p,q) process. Hence, this first step consists in identifying which process characterises best the time series of the considered business cycle.

It is an AR(1) for Germany, and an ARMA(1,1) for aggregate EU.

3.1.2 Analysing to what extent the CEECs fluctuations are explained by the common shock

For that purpose, we regress the series of UF $\{ u_{k,t} \}$ (where k is alternatively France, Portugal, Italy, Spain, each Central European Country and Germany) on the (lagged) common shock $\{ s_{i,t} \}$. More formally:

$$u_{k,t} = \sum_{j=0}^{l} c_j s_{i,t-j} + w_{k,t} \qquad (2)$$

[7] The best way would have been first to statistically identify this common shock with a methodology such as the one developed by Forni and Reichlin (1996), but, unfortunately, the cross section dimension of our panel was to small (less than ten countries) and did not allow for such an analysis.

The method of estimation is OLS or Cochrane-Orcutt when there is evidence of correlation. The number of lags (l) is set equal to 36, that is three years, to allow for large delays of transmission[8]. The $\left(c_j\right)_k$ vector of coefficients represents the impulse response function for country k[9].

3.1.3 Interpreting the results

The interpretation of the results is an evaluation of the extent to which the CEECs fluctuations are explained by the common shock, and whether the economic activity is positively correlated with the common shock or not. Two criteria are used :

1) First the R(2) of equation (2) indicates the percentage of variance explained by the common shock. If the fluctuations of the business cycles are highly explained by the common shock, the case for monetary independence is weak, so the cost of forming a monetary union is lower.
2) The second condition is that the impulses response function of country k $\left(c_j\right)$ is positively correlated with the impulses response function of EU member countries. The higher the correlation, the less costly should be a common monetary policy.

3.2 Results

Table 4 below reports the percentage of variance explained in equation (2), for each country, and the two types of shocks : German and European.

Table 4 : R(2) in equation (2)

	R(2) in equation (2) for a German Shock	R(2) in equation (2) for a European Shock
France	91%	74%
Germany		43%
Spain	43%	40%
Italy	18%	16%
Portugal	77%	65%
Czech R.	63%	27%
Slovak R.	83%	30%
Hungary	86%	35%
Poland	55%	24%

The relatively high R(2) for the CEECs in column II imply that the countries involved depend more than expected on the European shock. Furthermore, this degree of dependence is of the same order of magnitude as that of Spain. Column I highlights the way this dependence is operating : mostly through the German influence. Indeed, between 55% and 86% of the CEECs unemployment detrended cycles

[8] We did not test formally those, but used the results of Bonne and Maurel (1998), that showed that the highest correlation between EU business cycles could occur with lags as far as that.
[9] The coefficients have been smoothed with the Almon (1965) procedure.

are explained by German shocks. Therefore, the degree of monetary policy autonomy with respect to Germany should be weak. Note that France depends heavily on the German shock (the R(2) is set equal to 91%)), as could be expected.

Table 4 explains to what extent a shock in a given country may be accounted for by a German or European shock. A high degree of explanation is a first prerequisite for the business cycles of a pair of countries (or regions) to be similar. This is not enough. The pattern of transmission of this shock should then be similar too. That is what the subsequent analysis examines.

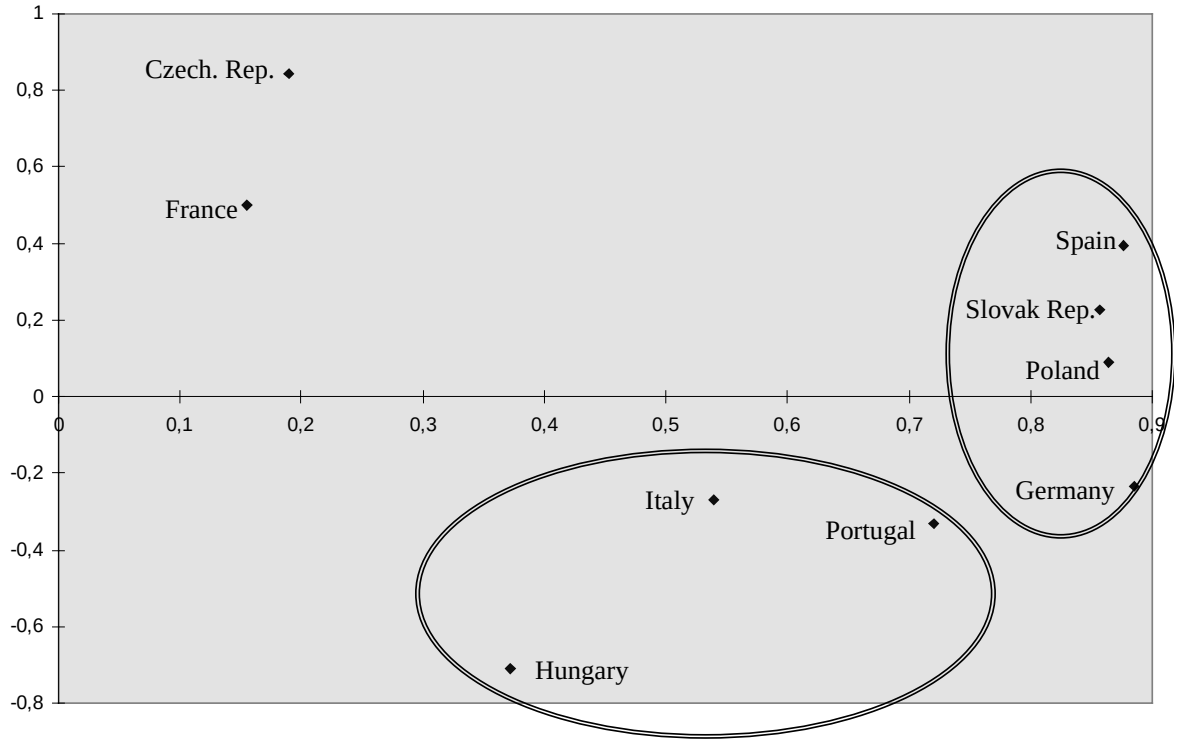
The principal components analysis (Figure 2) allows to project on a map, where the horizontal and vertical axis are the first two principal components, the vectors of coefficients, and to identify which of them are positively, negatively, or weakly correlated (see the matrix of correlation in the Annex) . The closest are the projections, the more similar are the two countries in terms of the relative responses to a German (respectively European) shock.

Figure 2 opposes two (or three) groups of countries : the CEECs (excluding the Czech Rep.) with Germany and Spain, Hungary with Italy and Portugal, and France with the Czech Republic[10]. Indeed, the CEECs impulse responses are as much correlated with German impulse responses (German - Slovak Rep. : 80%, German - Hungary : 68,26%, German - Poland : 66,09%) than Spanish with German (71,06%), while the similarity of the impulse responses between Spain and CEECs is quite high (Spain - Czech Rep. : 51,23%, Spain - Slovak Rep. : 82,53%, Spain - Hungary : 11,01%, Spain - Poland : 82,54). The negative correlation between France and Germany might come from different transmission delays or, as mentioned by Bayoumi and Eichengreen (1996b) to asymmetric output movements, maybe due to the reunification process.

Another evidence provided by figure 2 is that CEECs form a homogeneous group of countries, their impulse responses are positively correlated, implying that these countries are reacting in a similar way to an European shock.

[10] The correlation between France and the Czech Republic is set equal to 8,06% (see table 6 in the Annex), which is a low figure. Both countries have the same location in the map, which is an artefact, due to the fact that the countries, which belong to a n-dimension space, are projected on a two-dimension space.

Figure 2: Pincipal Component Analysis



4. Conclusion

This paper analysed the possibility of monetary integration of the CEECs with the EU. It was argued that : 1) the CEECs do not fully satisfy the Maastricht criteria (although Slovenia, the Slovak Republic, Hungary and the Czech Republic show a trend to improve their performance with respect to these criteria), but that might not be a strong impediment as long as these criteria are institutional and not economically structural, and this might be part of the completion of the transition process; 2) the benefits of joining the EU and eventually the EMU would be quite high for the CEECs from the point of view of the similarity of their business cycles, and indeed outweight the costs. More specifically, the transition process, and therefore real convergence, could be accelerated by a stable exchange rate regime. What are the costs of pegging the CEECs currencies ? These costs may be related to the degree of (a)symmetry of CEECs business cycles fluctuations with these of either Germany or aggregate EU, which has been shown here to be small. This paper, using dynamic common factor analysis, provided strong evidence on the existing symmetry between the CEECs business cycle and that of Germany, and to a lower extent that of the EU. Hence, despite failure to satisfy literally the Maastricht criteria and lack of real convergence for countries which failed to stabilise, this paper

supports the idea that for the CEECs, the benefits from pegging their currencies would be higher than the costs.

5. References

ALMON (1965)

ANDREFF W., (1998), « Nominal and Real convergence - At what speed ? », in J. van Braband, ed., The European Union, the transition economics, and the remaking of Europe, Rowman and Littlefield, Boudler.

BACKE P. P. and RADZYNER O. (1998), « The introduction of the Euro : Implications for Central and Eastern Europe. The Case of Hungary and Slovenia ». Focus on transition, Vol. I, Österreichische National Bank, pp. 47-71, Vienna.

BAYOUMI T., EICHENGREEN B. (1993), « Is there a Conflict between EC Enlargement and European Monetary Unification ? », Greek Economic Review 15: 1.

BAYOUMI T., EICHENGREEN B. (1996a), « Operationalising the Theory of Optimum Currency Areas », mimeo.

BAYOUMI T., EICHENGREEN B. (1996b), « Ever Closer to heaven ? An Optimum Currency Area index for European countries », mimeo.

BOONE L. (1997), « Symmetry and Asymmetry of Supply and demand Shocks in the European Union : A Dynamic Analysis », *Working Paper 9703*, CEPII.

BOONE L., HALL (1998), « Signal extraction and estimation of a trend : a Monte Carlo analysis », *Journal of Forecasting*, forthcoming.

BOONE L., MAUREL M. (1998), « Economic Convergence of the CEECs with the EU », *CEPR Discussion paper, n° 2018, London.*

CORICELLI, F. (1996), « Fiscal Constraints, reforms Strategies, and the Speed of transition : The Case of central and Eastern Europe », *CEPR Discussion paper, n°1339*, London.

CURRIE D. (1997), « The pros and Cons of EMU », The Economist Intelligence Unit, ISBN 0-85058-922-3.

DEMERTZIS M., HALLET A. H., RUMMELS O., (1998), « Is the European Union a Natural Currency Area, or is it held together by Policy Makers ? », mimeo.

FORNI M., REICHLIN L., (1996), « Dynamic common factors in large cross-sections », Long-Run Economic Growth, special issue of *Empirical Economics*, 21, pp. 27-42.

FORNI M., REICHLIN L., (1997), « « National Policies and local economies : Europe and the United States », *CEPR discussion paper, n°1632,* London.

FRANKEL Jeffrey A. and ROSE A. (1996), « The Endogeneity of the Optimum Currency Area Criteria », unpublished manuscript, University of California, Berkeley.

FUSS C., (1997), « Europe of regions or Europe of nations ? A dynamic factor analysis », mimeo.

HAVRYLYSHYN O., IVAILO IZVORSKI, and RON VAN ROODEM (1998), « Recovery and Growth in Transition Economies 1990-97 : A Stylised Regression Analysis », *IMF Working Paper*, WP/98/141.

SHARMINI COOREY, MAURO MECAGNI, and ERIK OFFERDAL (1997), « designing Disinflation Programs in Transition Economies : The Implications of Relative Price Adjustment », *IMF Paper on Policy Analysis and Assessment*, PPAA/97/1.

VON HAGEN J., (1996), in Lorand Ambrus-Lakatos and Mark E Schaffer (eds), *Coming to terms with Accession*, CEPR, London.

ANNEX

Table 5: Correlation between country i and country j vectors of impulse responses to a German shock

	France	Spain	Italy	Portugal	Czech R.	Slovak R.	Hungary	Poland
France	100,00%							
Spain	43,45%	100,00%						
Italy	-2,66%	5,33%	100,00%					
Portugal	6,96%	-45,25%	57,08%	100,00%				
Czech R.	38,64%	81,63%	-5,23%	-67,40%	**100,00%**			
Slovak R.	35,66%	73,12%	12,42%	-46,43%	**94,42%**	**100,00%**		
Hungary	37,67%	78,11%	-15,88%	-25,17%	**54,76%**	**53,07%**	**100,00%**	
Poland	68,04%	77,29%	-18,38%	-20,21%	**57,43%**	**53,31%**	**92,75%**	**100,00%**

The formula is : $\sum_{j=0}^{36}\left(c_j^k-\overline{c_j^k}\right)\left(c_j^l-\overline{c_j^l}\right)\Big/\sqrt{\mathrm{Var}\left(c_j^k\right)\mathrm{Var}\left(c_j^l\right)}$. The coefficients are estimated in equation (2) for i = Germany.

Table 6 : Correlation between country i and country j vectors of impulse responses to a European shock

	France	Germany	Spain	Italy	Portugal	Czech R.	Slovak R.	Hungary	Poland
France	100,00%								
Germany	-13,89%	100,00%							
Spain	24,31%	71,06%	100,00%						
Italy	2,24%	37,64%	27,61%	100,00%					
Portugal	19,97%	49,57%	40,59%	67,13%	100,00%				
Czech R.	8,06%	9,94%	51,23%	-25,92%	-28,23%	100,00%			
Slovak R.	-7,68%	80,00%	82,53%	40,37%	43,67%	55,52%	100,00%		
Hungary	-43,77%	68,26%	11,01%	-5,26%	26,78%	-37,80%	21,66%	100,00%	
Poland	50,77%	66,09%	82,54%	34,97%	67,47%	3,89%	54,11%	25,48%	100,00%

The formula is : $\sum_{j=0}^{36}\left(c_j^k-\overline{c_j^k}\right)\left(c_j^l-\overline{c_j^l}\right)\Big/\sqrt{\mathrm{Var}\left(c_j^k\right)\mathrm{Var}\left(c_j^l\right)}$. The coefficients are estimated in equation (2) for i = Europe.