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Mathilde Maurel

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By: Mathilde MAUREL

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Maurel Mathilde

WDI, 724 East University Avenue, Wyly Hall, Ann Arbor, MI 48109-1234,

CNRS-ROSES, University of Paris I, 106-112 Blvd de l'Hopital, 75013 Paris, France and CEPR. Email:

maurelm@univ-paris1.fr

Mailing address of the corresponding author: Maurel Mathilde, ROSES

106-112 Blvd de l'Hopital

75013 Paris, France

maurelm@univ-paris1.fr

Suggested running head: European Financial Integration and exchange rate regimes in CEECs

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Abstract

Candidate countries of central and eastern Europe (CEECs) are suppose to join the EU in 2004, June, which imply that they will face important challenges in the conduct of macroeconomic policy, in order to be able to enter the ERM-II system and eventually enter the EMU (European Monetary Union). Abandoning an independent monetary policy might entail significant costs for countries, which have succeeded in recovering and are in a process of catching-up. However those costs have probably been exaggerated, and their estimation biased by the traditional optimal currency area criteria. The main criticism against a too strong emphasis on the latter rests on two arguments. The first one is that assessing the trade-off for joining the EMU does not deliver the same conclusion *ex ante* and *ex post*. Meanwhile, the degree of financial integration will likely increase dramatically, which in turns will decrease the opportunity cost of loosing the monetary policy for absorbing country specific shocks. In a world of capital mobility, the room left for an independent monetary policy is very narrow, maybe close to zero in small, emerging countries, more vulnerable to speculative attacks than countries in the core. The second argument is more empirical. While the link between the exchange rate regime and the fundamentals is rather weak, the political agenda of joining the EU and subsequently the EMU seems to explain the choice of the exchange rate regime.

Keywords: exchange rate arrangements, accession to the EMU, EU enlargement, international capital flows.

JEL classification: F15, F41

Introduction

It is often argued that pegging the currency (and eventually adopting the euro) is optimal for two groups of countries: those for whom the benefits from stabilization largely exceed the cost of loosening their monetary policy; and those for whom the convergence process is sufficiently achieved to bring the degree of symmetry of business cycles close enough to a critical level. For countries, which enter the EU (European Union) in June 2004 and have achieved intermediate levels of restructuring, keeping their own currencies within the ERMII is an option as long as the process of increase in productivity gains continues. However the question of joining the EMU as soon as possible, even for these intermediary countries, is worth asking. The huge estimate of EU extra trade in Rose [2000] suggests indeed that fixing the currency does not only entail a significant cut-off in transaction costs, but it also significantly increases the degree of market integration while decreasing that of market imperfections[2]. It is true that loosing independent monetary policy might entail significant costs for countries, which have succeeded in recovering and are in a process of catching-up. But those costs have probably been exaggerated, and their estimation biased by the traditional optimal currency area criteria. The main criticism against a too strong emphasis on the latter rests on two arguments. The first one is that assessing the trade-off for joining the EMU does not deliver the same conclusion *ex ante* and *ex post*. Meanwhile, the degree of financial integration will increase dramatically, which in turns will lower the opportunity cost of loosing the monetary policy for absorbing country specific shocks. In a world of increasing financial integration, the room left for an independent monetary policy is very narrow, maybe close to zero in small, emerging countries, more vulnerable to speculative attacks than countries in the core. The second argument is more empirical. While the link between the exchange rate regime and the fundamentals is rather weak, the political agenda of joining the EU and subsequently the EMU seems to explain the choice of the exchange rate regime.

After reviewing the main arguments, which allow revisiting the traditional Optimal Currency Area criteria, we test in section 2 the Feldstein and Horioka [1980] hypothesis regarding the perfect capital mobility across European countries and across East European countries. We conclude that there is substantial room for increase in financial integration, which is likely to influence the *ex post* cost of loosing the monetary instrument. In section 3 we emphasize the quite substantial variation in exchange rate regimes, and we correlate in section 4 those observed exchange rate regimes across CEECs over

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[2] This second consequence might stem from the adoption of the monetary component of the *Acquis Communautair*e, that is strictly defined monetary and fiscal rules as well as informal ones (such as the stability pact, or the European Central Bank inflation target), which could influence the degree of capital market imperfection by lowering it.

the nineties, and the indicator of financial integration proposed by Feldstein and Horioka [1980][3]. While there is *a priori* no clear relationship between the status of capital liberalization and the choice of monetary and exchange rate regime, the result illustrate that the CEECs have been prone to adopt fix exchange rate regimes in a context of increasing capital mobility. This is interpreted in a framework where the choice of entering a Custom Union is a mostly exogeneous and political decision, as in Flandreau and Maurel [2001], and where this choice depends crucially upon the specific conditions faced in Central and Eastern Europe, namely the EU enlargement.

Section 1: revisiting the traditional OCA criteria

Assessing the cost of unilateral euroization can be done in the framework of the Mundell's well-known theory. Besides the fact that loosing the instrument of monetary policy can be costly in the presence of asymmetric shocks, when labour mobility is low and prices are rigid, the cost encompasses the loss of seigniorage and loss of Lender of Last Resort. While the former is usually fairly low, of the probable order of 1-2 percent of GDP according to Schobert [2001] in countries, which stabilised, in principle the function of Lender of Last Resort can be partially fulfilled by the Central Bank of the new common currency. In addition, according to Feige [2003], the level of dollarisation and euroisation in CEECs is fairly high[4]. The percent of total currency held as foreign currency ranges from 6% in Hungary to 35% and 41% in respectively Croatia[5] and Bulgaria. This implies a much weaker efficiency of domestic monetary policy and fiscal policy, foreign cash transactions corresponding to a switch toward the underground economy.

In the case of an enlarged Europe including Eastern countries, labor mobility is as low as within EU core countries, prices are supposed to be rigid, and fiscal transfers limited in the framework of the Maastricht Treaty. Last but not least, the degree of symmetry of shocks, which is already low enough among EU member countries, is even lower between East-West countries[6]. But one cannot assess *ex ante* the Optimal Currency Area (OCA) criteria, because the mere fact of entering a monetary union influences the way those criteria are satisfied. There is a large debate indeed, initiated by Frankel and

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[3] The Feldstein Horioka indicator is the difference between gross domestic savings to GDP and gross domestic investment to GDP.

[4] It is calculated on the basis of systematic information on cross border flows of US currency : "The Currency and Foreign Transactions Reporting Act […] requires persons or institutions importing or exporting currency or other monetary instruments in amounts exceeding 10,000 to file a Report of International Transportation of Currency or Monetary Instruments (CMIR) ". For other currencies holdings, a series of surveys conducted in several CEECs by the Austrian National Bank commissioned Gallup have been used. Feige [2003, pages 363 and 366].

[5] Kraft [2003] argues that the level of dollarisation/euroisation in Croatia limits the manoeuvring room for monetary policy.

Rose [1998] and Rose [2000], on the issue whether asymmetry fosters trade integration or not, and *vice vers*a. Rose [2000] shows that (i) membership in a currency union increases trade by a factor of three, while Frankel and Rose [1998] demonstrate that (ii) the higher the degree of trade integration, whether specialized or intra-sector, the higher the co-variation of economic cycles. If entering a monetary union according to (i) favors trade integration, this in turn according to (ii) makes symmetric shocks more likely, thus reinforcing the very sustainability of the CU.

However, these findings are based on mainly empirical evidence and there are at odd with the argument that specialization should increase the probability of asymmetric shocks. It might be that the focus on the supply side has been overemphasized. Flandreau and Maurel [2001] analyze the impact of monetary arrangements on trade integration and business cycle correlation in a more comprehensive framework. Focusing on late 19th century Europe, they formalize the demand forces induced by co-ordination of public policies alongside the specialization forces[7]. By this means, they are able to isolate the negative impact of trade integration on business cycles via the specialization channel, but this negative impact is overcompensated by the positive impact of public policy co-ordination. And as a result, the net effect of a CU on trade integration is positive. Then business cycles are used as a proxy for the external constraint. The basic assumption is that when business cycles are at odd, and when the financial market is reluctant to finance unbalances because of capital imperfections, the external constraint is binding and has a negative impact on trade. Conversely symmetry allows imports to be financed through exports in a smoother way. In a framework of two simultaneous equations, the authors calculate the extra trade generated by memberships into the Autro-Hungarian monetary Union, which is somehow intriguingly three times the average trade as in the controversial Roses's paper [2000]. This extra trade is part of the benefit from entering a Currency Union. No need to say that an order of magnitude of three times makes any other argument useless. In the Flandreau and Maurel's [2001] paper the main characteristic of a Currency Union lies on the coordination of the monetary policy and the resulting decrease in financial market imperfection. It rests on the assumption that asymmetry of business cycles decreases the case for making a monetary union.

This latter assumption is put into question in a recent paper by McKinnon [2002], who emphasizes also the financial criteria in the debate about the optimality of a Currency Union, but from the supply side. He recalls that somehow paradoxically, Mundell itself considered asymmetry to be a good reason

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[6] See Fidrmuc [2003] for an assessment of labor mobility in Eastern Europe, Bayoumi and Eichengreen [1993], for the low symmetry of EU shocks, Horvath and Ratfai [2004] for the even lower symmetry of East-West shocks.

[7] While Austria was specialised in Industry, Hungary was predominantly agricultural, which is not far from the actual pattern we observe between, say, Germany, and Poland, or Romania.

for joining a monetary union[8]: "[He] showed how having a common currency across countries can mitigate such shocks by better reserve pooling and portfolio diversification. Under a common currency, a country suffering an adverse shock can better share the loss with a trading partner because both countries hold claims on each other's output. Whereas, under a flexible exchange rate inhibiting portfolio diversification, a country facing an adverse shock and devaluing finds that its domestic-currency assets buy less on world markets. The cost of the shock is now more bottled up in the country where the shock originated (McKinnon, 2002, page 348)." Under a common currency, the risk of defaults on the redeemability of currencies is abolished. The country experiencing a bad event does not devaluate, and the other country agrees automatically on the internal price adjustment, which allows sharing the loss with the bad event and currency union member country (and symmetrically sharing the gain if a positive shock occurs).

In Mundell's paper the risk sharing is limited to money as the only financial asset. But McKinnon (2002) emphasizes that international diversification should be questioned for a broader set of financial assets[9]. He argues that it is inhibited by a principal-agent problem. Holdings of bonds by individuals are indeed general claims on financial intermediaries, which are not neither monitored nor controlled directly. The easiest way to solve the resulting principal-agent problem is to choose domestic money as the principal money, which leads to hypothesize that "*the fixed value of bonds held by domestic nationals the world over is largely denominated in the local (national) currency*" (McKinnon, 2002, page 353). This hypothesis echoes the long-standing literature on international capital flows and capital mobility. In the same way as capital flows are not sufficient for equalizing the yield to investors, or put in other words the saving that originates in a country tends to remain to be invested in this country, individuals tend to hold bonds denominated in national currency or to invest their savings domestically. Another approach for explaining the strong home bias in assets holding is to consider the

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[8] According to Mundell (1973, page 115): "*A harvest failure, strikes, or war, in one of the countries causes a loss of real income, but the use of a common currency (or foreign exchange reserves) allows the country to run down its currency holdings and cushion the impact of the loss, drawing of the resources of the other country until the cost of the adjustment has been efficiently spread over the future.*" More precisely (Mundell, 1973, page 119): "*Suppose that the two countries agree on the creation of a common currency. Before the spring harvest Capricorn puts into a world bank 50 units of the claims it holds on Cancer's spring crop, and gets in exchange 50 units of world money. When the spring crop emerges the Capricornians use their world money to buy 50 units of Cancer money from the bank of Cancer (which has agreed to accept world money) with which they buy half the spring crop ; and then the Cancerians exchange their 50 units of Cancer money for 50 units or world money. [...] At this point there will not to have been a gain to the system as a whole by the amalgamation of the two monies. But the gain appears when the variability of the crops is taken into account. For example, suppose again that the spring crop in Cancer is below the average, let us say at 70 units. Then Caprincorn consumers hold 50 units of the world money as do Cancer producers. [...] the 100 units of world money will exchange for the 70 units of food irrespective of who holds the money ; this is because competition and freedom of arbitrage assure the single price. The price of a unit of food thus rise to 100/70 for both Capricornians and Cancerians and the burden of the harvest fluctuation is met equally by the two islands. The common cyurrency assures an automatic and equal sharing of the risk of the fluctuations.*"
[9] Broader than M1, which represents a few percent of GDP in financially sophisticated economies, and a few percent of the total stock of private sector liquid assets (M3).

impact of exchange rate uncertainty on the distribution of capital across industries and across countries. While within the boundaries of a country one is entitled to assume that "highly paid analysts estimate the future risk and return of industry X against the general market, and winning firms against the others, which increase industrial efficiency" (McKinnon, 2002, page 358), the impossibility of predicting exchange rates, which behave like random walks, induce the same experts to recommend, for any one industry, lesser holdings denominated in foreign currency than in the domestic currency.

Section 2: estimating the potential for international risk sharing and further financial integration

The previous section concludes by inverting the traditional Mundel's criteria in stating that more symmetric countries benefit more from a common currency zone. It illustrates that sharing the risk of asymmetric shocks by joining a monetary union delivers higher payoffs for countries, which being specialized face a higher degree of shocks asymmetry, or for countries, which become more specialized as the very result of the monetary union. The purpose of this section is to estimate the potential for international risk sharing facing the CEECs, presumably specialized with respect to EU core member countries.

Our strategy is to measure the level of international capital flows, which indeed reflects the domestic bias analyzed by McKinnon (2002), that is the extent to which domestic saving tends to remain to be invested in the country. For assessing what it could within the EMU enlarged towards CEECs we apply the methodology proposed in Feldstein and Horioka [1980] to a sub-sample of EU actual member countries and to a sample of CEECs over the nineties. We estimate therefore equations of the form:

$$\left(\frac{I}{Y}\right)_i = \alpha + \beta \left(\frac{S}{Y}\right)_i \qquad (Eq.1)$$

$$\left(\frac{I}{Y}\right)_i = \alpha + \beta \left(\frac{S}{Y}\right)_i + \gamma \left(\frac{S}{Y}\right)_i * Openess_i \qquad (Eq.2)$$

Where $\left(\frac{I}{Y}\right)_i$ is the ratio of gross domestic investment to gross domestic product in country i and

$\left(\frac{S}{Y}\right)_i$ is the corresponding ratio of gross domestic saving to gross domestic product, and openess is the share of trade in GDP.

The sample consists of 15 EU countries (Austria, Belgium, Luxembourg, Denmark, France, Germany, Greece, Italy, Netherlands, Portugal, Spain, Sweden, United-Kingdom, Finland, Ireland), seven CEECs (Bulgaria, Hungary, Poland, The Czech Republic, Romania, Slovakia, Slovenia), and three Baltic State (Estonia, Latvia, Lithuania). The time span covers the period from 1989 to 2001. The size of the panel[10] provides a basis for consistent estimation. Domestic saving and investment as a fraction of GDP come from the World Bank Indicators CD-ROM.

Table 1 Mean Gross Domestic Saving and Investment Ratios for Western EU countries and Eastern and European countries, 1989-2001

	Saving in percent of GDP	Capital in percent of GDP	Absolute difference in percent of GDP
Western and European Countries			
Austria	23.79	23.49	0.71
Belgium	24.17	20.66	3.51
Finlande	25.45	20.17	6.08
France	21.33	19.97	1.40
Germany	23.43	22.12	1.44
Greece	13.25	20.98	7.73
Italy	22.12	19.46	2.66
Netherlands	26.78	21.64	5.15
Portugal	18.40	25.24	6.84
Spain	22.54	23.45	1.35
Sweden	22.32	17.68	4.64
Switzerland	25.88	22.29	3.60
United Kingdom	16.22	17.44	1.32
Norway	30.43	21.86	8.58
Luxembourg	33.75	22.41	11.36
Average	*23.32*	*21.25*	*4.42*
Eastern and European Countries			
Bulgaria	15.99	17.92	4.16
Czech Republic	27.88	29.23	3.37
Estonia	22.68	28.07	7.56
Hungary	23.31	25.08	2.69
Latvia	24.83	26.75	7.51
Lithuania	16.54	22.93	8.39
Poland	22.05	22.99	3.70
Romania	17.76	24.13	6.38
Slovak Republic	25.06	30.02	5.93
Slovenia	23.42	22.77	3.33
Average	*21.95*	*24.98*	*5.30*

The number of CEECs observations (EU observations) is 124 (192); Numbers in brackets are t-statistics.
Source: World Bank Indicators CD-ROM

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[10] 130 (13 years * 10 countries) observations for CEECs and 195 (13 years * 15 countries) for EU countries. Because of missing values we are left with respectively 124 and 192 observations.

Table 1 reflects the quite substantial variation in domestic saving and investment ratios among the Western EU countries. For the period 1989-2001, the ratio of gross domestic saving to gross domestic product averages 23%. This saving rate varies from a high 33% in Luxembourg to a low 13% in Greece. The corresponding ratios of gross domestic investment to gross domestic product also show substantial variation. The 13-years average gross investment ratio has a mean of 21%. Saving is higher than capital, which points to a capacity of providing higher returns countries with this available saving. A quite substantial variation characterizes also the patterns of saving and investment across Central and Eastern European countries. Most importantly investments (25%) exceed saving (22%), which illustrate that they are investment opportunities in those high growth and catching-up countries.

Table 2 below reports estimates of the basic equation 1 over the whole period as well as for sub-periods. With perfect capital mobility, an increase in the saving rate in country i would cause an increase in investment in all countries. Depending upon the size of country i, more precisely upon its initial capital stock and its elasticity of capital schedule, the savings coefficient beta is expected to vary from zero (small country) to country i's share of total world capital. For the perfect capital mobility assumption to be valid, beta has to be significantly lower than one. As stated in Feldstein and Horioka [1980], for OECD countries and over 1960-1974, it should be less than 0.10.

In most empirical studies[11] empirical analysis fails to validate the assumption of a world of perfect capital mobility. Frankel [1992] mentioned different points, which have been made for explaining this failure. Firstly, national saving might be endogeneous[12], implying that the estimated beta is biased upwards. The second explanation lies in the fact that for large countries, the interest rate is not exogenous, and determines both national savings and investment[13]. The third explanation is that real interest parity does not hold, because of the existence of currency factors, namely currency premium. Of course if there are differences in rates of return across countries, the Feldstein-Horioka condition cannot be observed.

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[11] For an exhaustive review of the literature one can consult the excellent paper by Flandreau and Riviere [1999], where about 16 references are listed and commented. The main thesis of the authors is that the move towards a financially integrated world is very recent, it starts at the beginning of the nineties, and is limited to Europe and OECD countries. Our results are quite compatible with this view.

[12] The point that saving and investment are co-cyclical has been recently emphasized in a framework where both variables are cointegrated with a long-run unit coefficient. The difference between them, the current account balance, is a stationary process. The lower Feldstein-Horioka cross-section regression coefficient for developing countries is due to a policy response, which is less capable of restoring current account balances. See Coakley, Hasan, and Smith [1999].

[13] Those explanations are not really satisfactory, in as much as the use of instruments does not help to reduce the estimated beta.

Our results are quite interesting. Where others have failed, we succeed in illustrating a great deal of financial integration across European countries[14], whatever the procedure used. It is worth mentioning that the fixed-effects procedure allows eliminating the endogeneity coming from a correlation between any non-observed time-invariant variable and the residuals. Over the whole period estimates vary from 0.09 (between estimates) to 0.16 (random estimates), and after 1995 they do not differ significantly from zero. This result supports the idea introduced by Frankel [1992] that the failure of the Feldstein-Horioka test may in fact be due to currency factors. Further empirical support is provided by Bayoumi and Rose [1993]. As in the case of the EU in the late 90ies, they find no positive correlation between saving and investment across national regions[15]. Harvey and alii [1996] duplicate the Bayoumi and Rose [1993] result but for the pre-1995 twelve members of the EU during the period 1971-1991[16].

Table 2a The Relation between Domestic Saving Ratios and Domestic Investment Ratios

	EU countries			CEECs		
	Random effects	Fixed effects	Between effects	Random effects	Fixed effects	Between effects
Whole period	0.16	0.19	0.09	0.54	0.52	0.72
	(2.76)	(2.71)	(0.86)	(9.23)	(8.54)	(3.58)
Before 1995	0.35	0.61	0.15	0.62	0.63	0.54
	(4.24)	(5.01)	(1.41)	(8.23)	(7.78)	(2.48)
After 1995	0.018	-0.0017	0.05	0.69	0.59	0.76
	(0.27)	(-0.02)	(0.46)	(5.01)	(2.81)	(4.15)
Fandreau M. and Riviere C. (1999)	0.339	0.681	0.224			
	(13.03)	(6.42)	(6.4)			

The number of CEECs observations (EU observations) is 124 (192); Numbers in brackets are t-statistics.
Source: World Bank Indicators CD-ROM
Flandreau and Riviere (1999) estimates are reported for the purpose of comparison. They run equation 1 for a sample of 24 countries, over a period of floating exchange rates: 1974-1996.

By contrast CEECs face a quite substantial degree of rigidities and locational preference, despite the dramatic increase in opening the Eastern capital markets over the last decade. Let compare within estimates before and after the middle of the decade: equal to 0.61 and 0.63 for EU countries and CEECs, they are set equal to a number not significantly different from zero for EU countries but still high and significant for CEECs (0.59), which do not yet benefit from memberships into the wide

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[14] As suggested in the Flandreau and Riviere's paper [1999], in which the very low process of financial integration is described as an historical long-term phenomena, which broke up during the two world wars while the nineties are characterized as having promoted its acceleration within old-industrialized countries including European ones.

[15] They compute the correlation of saving and investment across national regions, within the United Kingdom.

European financial market. This result suggests that memberships into the EU will bring about significant increase in financial integration and capital mobility. This increase in financial integration makes quite implausible the idea that flexible exchange rates allow independence in monetary and domestic policies; it decreases therefore the *ex post* opportunity cost of an early adoption of the euro.

Table 2b below simply reports the estimates of equation 2, where the link between domestic investment and domestic saving is allowed to vary with the degree of openness of the economy. As emphasized in Feldstein and Horioka [1980, page 322], it is likely that small economies, more involved in international trade, have a much weaker link between domestic saving and domestic investment than large and nearly autarchic economies. The estimated coefficients of openness are negative as expected, although quite small.

Table 2b The Relation between Domestic Saving Ratios and Domestic Investment Ratios

	EU countries			CEECs		
	Random effects	Fixed effects	Between effects	Random effects	Fixed effects	Between effects
Savings coefficient	0.43	0.59	0.083	0.43	0.43	0.51
	(4.76)	(5.60)	(0.48)	(4.97)	(4.70)	(1.59)
Savings time openness coefficient	-0.001	-0.001	0.00	0.001	0.000	0.001
	(-3.82)	(-4.87)	(0.10)	(1.71)	(1.29)	(0.90)

The number of CEECs observations (EU observations) is 119 (192);
Source: World Bank Indicators CD-ROM

If that trade openness is often associated with capital mobility, a *contrario,* in a world of imperfect finance (i.e. low capital mobility), the current account constraint may become an obstacle when the financial system is reluctant to tolerate and finance growing bilateral trade imbalances. Flandreau and Maurel [2001] interpret the degree of symmetry of business cycles as a proxy for the need of financing the imbalances between import and export. They consider capital financial integration to be a substitute for the symmetry of business cycles and to promote trade integration. Results presented here support the view that financial integration allows sharing the risks[17] (from the supply side), and

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[16] However this considerable degree of capital market integration is considered as puzzling. It is not observed during the period of increasing financial integration. Instead the authors observe a pronounced business cycle effect, implying that beta is positive (negative) during expansionary (recession) phases.

[17] As underlined in McKinnon [2002, page 354], it is more useful when countries are more specialized and more exposed to asymmetric shocks: "Once risk-sharing through portfolio diversification in bond holding is properly weighted, the case for a monetary union becomes eve stronger as the constituent parts of the underlying economic union become more specialized in what they produce. Presumably, the productivity gain from greater regional specialization is one of the major benefits of having an economic cum monetary union in the first place!"

compensating for the negative impact the current account constraint has on the intensity of trade integration (from the demand side).

Section 3: monetary and exchange rate regimes in transition economies

Before turning to the relationships between the exchange rate regime and the degree of financial integration, this section aims at illustrating that, despite the current diversity in exchange rate regimes among transition countries, neither the economic fundamentals nor the traditional OCA criteria the point unambiguously in one direction as regards the regime choice: CEECs have made considerable progress in establishing fairly low levels of exchange rate variability and low inflation (see tables 3 and 4); there is no evidence of a Balassa-Samuelson effect sufficiently substantial for making an argument against fixing the exchange rates; whatever their respective fundamentals, CEECs are small and vulnerable countries, often unable to benefit from the conduct of "independent" monetary and fiscal domestic policies.

On the question of the appropriate exchange rate regime, different views are competing. In a recent IMF Policy Discussion Paper, Gulde et al. [2000] argue that currency board arrangements have favoured low inflation and higher growth. Furthermore, satisfying by definition the Maastricht criteria of no exchange rate variability and low inflation, currency boards may serve the way up to the adoption of the euro. Instead, Corker et al. [2000] emphasize the risk of speculative attacks at the eve of joining the euro area. Any exchange rate regime is feasible, from currency board to any more flexible exchange rate arrangement, but the most important is to be credible and sustainable in an environment of likely large capital inflows and asymmetric shocks. The bipolar view argues that in a world where countries have a large access to international markets and where capital moves freely, only two options are sustainable, flexible exchange rate and fixed exchange rate, both meaning a commitment to give up altogether an independent monetary policy. Whether this view is supported by empirical evidence is a matter of controversies. For Masson [2000] there is no statistical evidence that the number of transitions from intermediate exchange rate regimes towards polar ones is increasing over time, and this turns out to be particularly true for Transition Countries over the nineties, where the major (and recent) moves are towards an increasing number of intermediate regimes. Among CEECs (Czech Republic, Estonia, Hungary, Poland, and Slovenia), there is one currency board (in Estonia), and three moves from less flexible exchange rate arrangements towards more flexible ones (in the Czech Republic, Hungary, and Poland). Romania and Slovakia moved from tightly managed to relatively free float, while Bulgaria, for stabilization purposes, implemented a currency board (see table 5). This diversity of exchange rate regimes in Central Eastern Europe is emphasized in a recent work by Bénassy-Quéré and Coeuré [2000], who argue that once the regional dimension is accounted

for, there are more than two corner solutions. The authors emphasize that the perspective of a monetary union in the long run can make intermediate regime more robust in the meantime, and that these regimes must be managed through co-operation and economic policy co-ordination.

CEECs have to make compatible the agenda of entering the EU and the catching-up process. These two objectives might turn out to be contradictory: joining the EU imposes low inflation and exchange rate variability, while higher than EU average growth implies higher inflation and exchange rate variability. Hence the very restructuring process would justify a monetary policy and exchange rate policy aiming at accommodating the adverse consequences of real appreciation and inflationary pressures, and would exclude participating into EMU in a near future; CEECs would have better to wait up to the uncertain date when the process of restructuring is over). A recent paper by Coricelli and Jazbec [2001] provides evidence that this widespread belief is overstated. The real exchange rate behavior is well influenced by structural reforms[18], at least at the beginning of transition, but this influence diminishes through time, and finally stabilizes around the fifth or sixth year. "For several Central and Eastern European countries in the process of accession to the European Union, the dynamics of the real exchange rate can now be assimilated to that of previously acceding countries such as Spain, Portugal, and Greece, with the Harrod-Balassa-Samuelson effect playing a dominant role at later stages of transition."

Another argument bordering on the above Balassa Samuelson effect is that the probability of asymmetric shocks might be still high, requiring the use of an independent monetary and exchange rate policy. But if, following again Coricelli and Jazbec [2001], we assume that the influence of asymmetric shocks imputable to restructuring is over, then the question is to know whether the cost of accommodating higher inflation and productivity gains by labour and price flexibility outweighs the benefit of being a member of the EU currency union. The same question was asked for Mediterranean countries when they were candidates. In Babetski et alii [2002], it is shown that the nineties have been characterized by an increase in the symmetry of demand shocks across EU and Transition countries: hence the cost of giving up monetary independence could be decreasing. Fidrmuc and Schardax [2000] argue that one explanation behind the increase in the symmetry of shocks lies in the pattern of trade (increasingly intra-industry).

The choice of the exchange rate regime does not seem to have been determined by any particular economic situation: the wide range of exchange rate regimes is not correlated with fundamentals. Furthermore, CEECs often tried to manage their currency in order to be in compliance with Maastricht

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[18] Structural reforms are measured by the ratio of the workers employed in manufacture on the number of workers employed in services, and instrumentalised by the structural reform index of De Melo, Denizer and Gelb [1996] and total credit to the private sector (EBRD Transition Report, 1999).

criteria, even if the latter were not formally required for the countries under consideration[19]. Once they enter the EU, countries are left with the following three options: fix the currency at the price of an increase in unemployment and painful macro-economic adjustment, let short-run and long-run capital flow in at the risk of increasing financial instability, or join the EMU as soon as possible. The benefit from joining the EMU might far exceed the associated costs: it comes not only from budgetary transfers from the West, but also from the possibility of facing lower interest rates without raising uncertainty and increasing risk of speculative attacks[20]. In other words, joining EMU implies avoiding the difficult trade-off between on the one hand low interest rates but increasing financial vulnerability and high interest rates but increase in unemployment on the other. Coricelli [2002] emphasizes also that an early adoption of the euro would eliminate immediately both the vulnerability of the countries to sudden shifts in capital flows and the interest rate premium; it is the optimal exchange rate strategy in candidate countries. ERMII has two rationales: the Balassa-Samuelson effect, which requires exchange rate flexibility, and the necessity of finding an equilibrium level for the exchange rate. While the empirical evidence supporting the Balassa-Samuelson effect is rather weak[21], it is clear that "the adoption of a wide band will generate high volatile capital flows that will cause exchange rate movements unrelated to movements in the fundamentals" (Coricelli [2002, page 412]). Mario Nuti [2002] goes still further: "there is no legal or economic justification for EU aversion to unilateral euroization in accession candidate countries".

Section 4: international capital flows matter for the exchange rate regime choice

Feldstein and Horioka [1980] emphasise that the international mobility of the world's supply of capital is crucial for analysing a wide range of issues, including the optimal rate of saving and the incidence of tax changes. One should add to this wide range of issues the room left for monetary policy independence under a fixed exchange rate regime, as emphasised previously, and symmetrically the extent of fiscal policy independence under a flexible exchange rate regime. As we know from the traditional Mundellian analysis, an increase in financial integration lowers the efficiency of fiscal and monetary policies. In other words, in the same way it can change the incidence of tax changes, the international mobility of capital might undermine a policy aiming at absorbing asymmetric shocks (whatever the nature of the exchange rate regime, flexible or fixed). In addition this international mobility of capital is far from occurring in a world where the perfect financial markets postulate holds. Bubbles, multiple equilibriums, imperfect information, which are a very probable feature of contemporary financial markets, and the increasing capital mobility have raised the consensus

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[19] See Gomulka [2001] and Coricelli [2002].
[20] The financial gain is emphasized in Flandreau and Maurel [2001].

amongst economists that removing capital movement restrictions has brought about increased financial instability, and that the greater capital mobility makes very difficult the credibility and sustainability of any exchange rate regime, whatever flexible or fixed[22].

In the specific case of CEECs what makes the difference between floating or fixing is the (political) commitment of entering the EU, adopting the euro, and giving up currency sovereignty for the economic gain of being member of a large economic entity. As emphasised in Daianu and Vranceanu [2002], the sequencing of capital account liberalization depends upon a range of country specific characteristics: the success of macroeconomic stabilisation, the building-up of an international economic credibility, the level of public deficit and public debt – both are supposed to be kept under strict limits by the EU enlargement agenda – the quality of the financial system and the efficiency of prudential rules… But for what regards candidate countries in Central and Eastern Europe, perhaps the most important feature is that those countries are going to be members of the EU. As such, they are requested to proceed to an orderly liberalization of capital flows, medium and long term flows in a first stage, with the option of applying for a temporary derogation regarding certain type of capital during the first years of memberships (in sensitive sectors or acquisition of some types of real estate). They are also supposed to prepare themselves for the adoption of the euro, which means renouncing to the monetary policy autonomy in a world of high capital mobility[23]. Under a flexible exchange rate regime, they could in principle regain a full autonomy over the monetary policy, but at the cost of increased financial instability, exchange rate fluctuations, and fluctuations in macroeconomic variables, which are associated to losses. Perhaps more importantly the resulting insulation from the European monetary market is not compatible with the perspective of joining the European Union. In addition, while CEECs have rather low public debt ratios (see table 6), the debts tend to be mainly in foreign currencies. Servicing the latter depends upon the changes in the exchange rates, which under flexible exchange rate regimes are likely to be quite large and volatile in such emerging and peripheral countries like the CEECs[24].

In what follows we propose to assess the impact of the mobility of capital on the exchange rate regime choice. The assumption we are going to test is that the increase in financial integration has pushed CEECs towards the adoption of fixed exchange rate regimes. The opposite could have been observed.

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[21] Szapary [2002] reports that according to different studies the estimates of the Balassa-Samuelson effect vary between 2 and 4%. This translates into pressures on the real exchange rate of the order of one percent per year (Coricelli [2002, page 411]).
[22] Which would justify maintaining some capital controls on a unilateral basis: see Rodrick [1997] and Bhagwati [1998].
[23] This latter strategy might have some risks associated with the probability of facing speculative attacks during the ERMII phase.
[24] The idea that flexible exchange rate permit independence in monetary policy is criticized vigourosly by Coricelli [2002], on the basis that large capital inflows imply balance of payment crisis and exchange rate adjustments.

More financial integration could have been associated with more flexibility as a way of regaining over the monetary independence. But as emphasised before this would not have fitted the Eastern European agenda of entering the Europe[25]. In other words the specificity of the CEECs is that they face and will continue to face a dramatic increase in financial integration (and financial instability) within the European frontiers, which make inefficient both flexible and fixed exchange rate regimes and oblige them to give up the use of the monetary and fiscal policy as a way of absorbing asymmetric shocks[26]. Given the institutional features of the EU enlargement, which requires the adoption of the monetary part of the *Acquis Communautaire* (adoption of the euro), the increase in capital mobility and the ongoing neutrality of exchange rate regime should be associated with more fixity.

For testing this assumption we correlate an exchange rate regime variable with the indicator of international financial integration *FIN* proposed in Feldstein and Horioka [1980], which is the absolute difference between saving and investment rates in percent of GDP. If incremental saving tends to be invested in the country of origin, differences among countries in investment rates should reflect closely differences in saving rates, and the indicator should be biased towards zero. Conversely the higher the degree of international financial integration, the more the indicator moves away from nil. The IMF Exchange Rate Regime Classification *Exch.Rate* (see table 5) is a discrete variable taking value from one (dollarization or Euroization) to eight, which corresponds to the most flexible regime (independent float). We regress *Exch.Rate* on *FIN* and on variables measuring the asymmetry of demand DS_{it} and supply shocks SS_{it}. Demand and Supply shocks allow controlling for the level of asymmetry - more symmetry favouring the choice of a fixed exchange rate regime. The coefficient DS_{it} (SS_{it}) takes values from zero to one. The closest to zero is the coefficient, the highest is the level of convergence[27]. The sample contains eight transition countries[28] from 1995 to 2001, and the data are quarterly. We run both OLS and ordered probit.

$$Exch.Rate_{it} = \alpha FIN_{it} + \beta DS_{it} + \gamma SS_{it} + u_{it} \qquad (Eq.3)$$

Results in table 7 support the view that the increase in capital mobility has been accompanied by a move towards more fix exchange rate regimes. In Babetski et alii [2002] it is assumed that demand

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[25] Flandreau and Maurel [2001] emphasise that entering a Currency Union is not a matter of economic rationale, it is essentially a political choice. This assumption allows them to specify the instruments they use in order to properly estimate the impact of memberships into a Currency Union on trade. Here we argue that once countries have choosen to adopt the euro, that is to loose the monetary policy instrument, they are more prone to fix the currency when the financial constraint is more binding.

[26] One could imagine that the requirement for being member of the EU would be to implement flexible exchange rate regimes, which would make fiscal policy inoperant, and to use monetary policy strictly for stabilisation purposes.

[27] The latter are taken from Babetski et alii [2002], and the methodology is described in more details in Annex 2.

[28] The Czech Republic, Estonia, Latvia, Hungary, Poland, Romania, The Slovak Republic, and Slovenia.

shocks are very much conditioned by the nature of the monetary regime, whereas supply shocks are reflecting the process of transition towards the market. The positive correlation between the convergence of demand shocks and the exchange rate regime variable corresponds to the very product of the alignment of CEECs monetary policy on the EU monetary policy, and therefore to the setting-up of fixed exchange rate regimes. More demand symmetric countries tend indeed to fix their currencies.

Supply shocks reflect more fundamental variables, for instance productivity gains occurring only in transition countries. According to discussion in section 3, they are not expected being correlated with the choice of any particular exchange rate regime. We interpret there the negative and significant estimate between the divergence of supply shocks and the exchange rate regime variable as reflecting the fact that more asymmetric countries in the sample, Bulgaria and the three Baltic States, have tended to fix their currencies. Another interpretation relies on the argument raised by Mundell (1973), according to which more asymmetric countries have better to fix their currency in order to share the risk and diversify their portfolio.

Table 7 Probability of exchange rate regime i being observed

Explanatory variables:	OLS	Ordered Probit	OLS	Ordered Probit
Financial Integration	-0.15	-0.09	-0.16	-0.08
	(-4.43)	(-3.87)	(-4.41)	(-3.37)
Coefficient of supply shock asymmetry with the EU	-1.52	-0.69		
	(-4.61)	(-3.05)		
Coefficient of demand shock asymmetry with the EU	2.60	1.62		
	(6.43)	(5.70)		
Coefficient of supply shock asymmetry with Germany			-2.38	-1.40
			(-6.52)	(-5.48)
Coefficient of demand shock asymmetry with Germany			2.92	1.55
			(5.31)	(4.00)
Number of Observations	216	216	203	203
R-Squared	0.31	0.09	0.33	0.10

T or Z-Statistics in brackets
The exchange rate regime takes values from 1 (euroization) to 8 (independent floating)
Coefficients supply and demand shocks asymmetry are taken from Babetski et alii [2002], see Annex 2.

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Conclusion

The greater diversity of exchange rate regimes across CEECs is striking if one considers that those countries have achieved similar restructuring, institutional reforms, and macroeconomic stabilization. This paper goes further and asks the question of the optimal exchange rate regime during the process of the EU enlargement. It emphasizes that in the European context, which is a context of perfect capital mobility in the sense of Feldstein and Horioka [1980], the idea that the choice of the exchange rate regime, whatever flexible or fixed, matters for dealing with asymmetric shocks, turns out to be an illusion. On the other hand one important institutional and political feature of the EU enlargement is the subsequent adoption of the EMU. The latter is crucial for understanding why the nineties and the ongoing (as well as expected further) increase in financial integration have been characterized by a significant move towards more fix exchange rate regimes, as shown in section 3.

As in Nuti [2002] and Coricelli [2002], this paper supports the view that an early adoption of the euro is the optimal strategy for emerging countries, peripheral to the wide European market and highly vulnerable to capital switches. It stresses the point that the *ex post* opportunity cost of adopting the euro is very low. If the *ex post* degree of capital mobility can be expected to be that currently observed within European countries indeed, as calculated in section 2, then there will be no room left for conducting any monetary policy insulated from the rest of the Union (the same acknowledgement of inefficiency would apply to more flexible exchange rate regimes and their associated fiscal policy). The rationale for ERMII is very low if one considers like the author of this paper that the assumption that financial and monetary markets are related to fundamentals, at least in the short run, does not hold. Furthermore one important contribution of this paper is to emphasize that what really drives the choice of the exchange rate regime is the political decision to enter the EU and subsequently to adopt all the *Acquis Communautaire*. Put in other words the perceived gains are so large tat they outweigh the risk of fixing the exchange rate at an inappropriate level.

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Annex 1

Table 3 Inflation rate[1] (% change, annual averages)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Bulgaria	26.3	414.4	91.3	72.9	95.9	62.2	121.6	1058.4	18.7	2.6	10.3	7.4	5.8
Czech Rep.	9.7	52.0	11.1	20.8	9.9	9.1	8.9	8.4	10.7	2.1	3.9	4.7	2.2
Hungary	39.2	34.8	23.2	22.5	18.9	28.3	23.6	18.3	14.1	10.0	9.8	9.2	5.3
Poland	553.6	76.8	45.3	36.9	33.3	28.0	19.8	15.1	11.7	7.3	10.1	5.5	2.2
Romania	5.1	170.2	210.4	256.1	136.8	32.3	38.8	154.8	59.1	45.8	45.7	34.5	23.0
Slovakia	10.8	61.2	10.0	23.2	13.4	10.0	5.8	6.1	6.7	10.5	12.0	7.1	3.3
Slovenia	551.6	115.0	207.3	32.9	21.0	13.5	9.9	8.4	7.9	6.1	8.9	8.4	7.4
Estonia	23.1	211.0	1077.7	89.8	47.6	29.0	23.0	11.2	8.2	3.3	4.0	5.8	3.5
Latvia	10.5	172	951	109	35.9	25.0	17.6	8.6	4.5	2.4	2.7	2.5	1.6
Lithuania	8.4	225	1021	410	72.2	39.6	24.6	8.9	5.1	0.8	1.0	1.3	0.4
CEECs average excl. Bulgaria and Romania	151	119	418	93.1	31.5	22.8	16.7	10.6	8.6	5.3	6.6	5.6	3.2
Euro area average	4.6	4.1	4.6	3.9	3.2	3.0	2.5	1.9	1.4	1.2	2.4	2.7	2.1
EU average	5.1	4.7	4.5	3.7	2.9	2.9	2.5	1.8	1.4	1.2	2.1	2.5	2.0
"3 best EU" av.[2]	4.3	4.1	4.4	3.5	2.6	2.2	1.9	1.7	1.1	0.8	1.7	2.1	1.4

Notes:
  [1] Percentage change in consumer price index in local currency (period average), over previous year.

  [2] Three "best performing EU countries" with lowest inflation in 2002 are United Kingdom, Germany and Austria

Sources: The Economist Intelligence Unit Country Data, 2002; EBRD Transition Report, 2001; Babetski, Boone, Maurel [2002] computations

Table 4 Volatility of nominal exchange rates[1] (%)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Bulgaria	n.a.	24.5	5.5	39.7	20.1	77.0	85.6	15.2	0.4	0.0	0.0	0.0
Czech Rep.	n.a.	n.a.	n.a.	1.4	1.2	1.0	4.4	4.3	2.9	2.6	2.8	5.5
Hungary	8.0	6.2	4.4	9.6	16.0	10.3	5.8	7.9	4.3	1.8	2.3	3.4
Poland	6.9	17.3	12.6	14.5	9.5	4.9	5.7	4.7	5.4	3.7	5.6	5.1
Romania	94.7	77.5	48.5	41.7	19.2	22.1	36.9	14.8	26.7	13.2	14.8	10.1
Slovakia	n.a.	n.a.	n.a.	3.9	1.6	0.9	1.5	3.9	6.7	2.8	1.6	1.7
Slovenia	n.a.	n.a.	14.4	8.4	2.1	5.6	3.2	2.0	2.4	3.5	3.4	2.2
Estonia	n.a.	n.a.	2.1	0.8	1.6	1.3	1.8	0.5	0.5	0.1	1.0	1.1
Latvia	n.a.	n.a.	17.1	13.8	2.5	1.3	3.4	2.0	3.8	6.4	2.6	2.5
Lithuania	n.a.	n.a.	n.a.	10.5	6.4	2.4	6.1	3.4	4.4	8.6	4.6	2.7
CEECs average	36.5	31.4	14.9	14.4	8.0	12.7	15.4	5.9	5.8	4.3	3.9	3.4
US	5.8	5.8	6.5	3.7	5.9	2.4	6.1	3.4	4.4	8.6	4.6	4.4

Note: [1] Standard deviations in percent to average nominal exchange rates to ECU/Euro over two preceding years

Source: Babetski, Boone, Maurel [2002] computations based on the IMF International Financial Statistics, November 2002, monthly averages

Table 5 Exchange rate regimes in the CEECs

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Bulgaria	3	8	8	8	8	8	8	2	2	2	2	2	2
Czech Rep.	3	3	3	3	3	3	6	7	7	7	7	8	7
Hungary	3	3	3	3	3	6	6	6	6	6	6	4	4
Poland	3	5	5	5	5	6	6	6	6	6	8	8	8
Romania	3	7	7	7	7	7	7	7	7	7	7	6	7
Slovakia	3	3	3	3	3	3	6	6	7	7	7	7	7
Slovenia	n.a	n.a	7	7	7	7	7	7	7	7	7	7	7
Estonia	n.a.	n.a.	2	2	2	2	2	2	2	2	2	2	2
Latvia	n.a	n.a	8	8	3	3	3	3	3	3	3	3	3
Lithuania	n.a	n.a	8	8	2	2	2	2	2	2	2	2	2

IMF Exchange Rate Regime Classification
1: Dollarization, no separate legal tender
2: Currency Board, currency fully backed by foreign exchange reserves
3: Conventional Fixed Pegs, peg to another currency or currency basket within a band of at most ±1%
4: Horizontal Bands, pegs with bands larger than ±1%
5: Crawling Pegs, pegs with central parity periodically adjusted in fixed amounts at a fixed, pre-announced rate or in response to changes in selected quantitative indicators
6: Crawling Bands, crawling pegs combined with bands of more than ±1%
7: Managed Float with No Preannounced Exchange Rate Path, active intervention without precommitment to a preannounced target or path for the exchange rate
8: Independent Float, market-determined exchange rate and monetary policy independent of exchange rate policy.
Sources:
1990 – 2001: Begg D., Eichengreen B., Halpern L., von Hagen J., Wyplosz, C. 2002. "Sustainable Regime of Capital Movements in Accession Countries" Table 2. Exchange Rate Regimes in accession states.
2002: Babetski, Boone, Maurel [2002] updates.

Table 6 Public debt*** (% GDP)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Bulgaria	n.a.	n.a.	158,7	150.1	169.0	114.7	300.5	103.0	79.8	84.9	77.1	70.2	66.0
Czech Rep.	n.a.	n.a.	n.a.	18,8	17,6	15,3	13.7	13.5	13.7	15.0	18.8	23.0	30.6
Hungary	n.a.	74.6	79.0	90.4	88.2	86.4	72.8	63.9	62.3	61.2	55.6	54.1	57.6
Poland	n.a.	n.a.	147,3	88,7	72.4	54.3	47.9	46.9	42.9	43.4	39.6	40.4	44.9
Romania	n.a.	10.7	25.7	24.8	21.6	26.2	33.4	32.8	32.3	32.7	31.5	31.2	31.7
Slovakia	n.a.	n.a.	n.a.	37.5	35.8	35.6	35.1	38.6	36.1	35.7	41.0	41.8	45.5
Slovenia	n.a.	n.a.	45,6	33.7	28.4	28.0	29.6	31.9	32.6	35.5	36.8	36.4	34.4
Estonia	n.a.	n.a.	3.3	5.1	4.7	4.5	5.0	4.3	4.5	4.0	4.0	3.0	3.0
Latvia	n.a.	n.a.	n.a.	n.a.	14.2	16.2	14.5	12.0	10.4	13.1	13.3	15.0	14.9
Lithuania	n.a.	n.a.	n.a.	14.8	15.8	19.5	23.2	19.1	22.4	28.3	28.2	26.9	24.4
CEECs average	n.a.	42.7	36.0	50.9	50.0	42.8	57.6	36.6	33.7	35.4	34.6	34.2	35.3
Euro area average	61.0	61.2	65.1	69.3	71.1	75.1	77.9	78.1	77.4	75.3	73.1	72.3	72.5
EU average	58.0	58.5	63.1	68.1	69.3	73.2	75.2	74.8	74.3	71.4	68.7	67.7	67.4

Sources: The Economist Intelligence Unit Country Data, 2002; EBRD Transition Report, 2001; Babetski, Boone, Maurel [2002] computations

Annex 2

Babetski, Boone and Maurel [2002] methodology

Following the literature derived from OCA theory that was used to assess the cost of EMU for "euroland countries", we answer this question by assessing the differences in business cycles between the EU and the eastern countries[29]. The idea is that the closer the fluctuations of the countries, the more they will benefit from a common policy response. On the other hand, if shocks are asymmetric then giving up a tool of national policy management will be costly. A measure of the similarity of business cycles across countries is the correlation of demand shocks, and its evolution since the transition process began. Furthermore, with respect to transition countries, the similarity of supply shocks should also be analysed. The former will reflect temporary shock and hence the shape of the business cycle, while the second will represent the structural side of the economy.

For current EMU countries, the exchange rate was mainly a demand stabilisation tool. For transition countries however, foregoing the exchange rate is foregoing a tool that was used to adjust both demand and supply shocks, as exchange rate policies have often been used to help address the adverse supply shocks of the transition towards a market economy, which rendered entire sectors non competitive. They consisted sometimes of huge devaluations (see Poland) to smooth the restructuring process and the increase in unemployment. In the long run, of course, the currency should return to its equilibrium value, which implies a steady appreciation as progress in restructuring is made, liquidation of uncompetitive sectors at world market clearing prices occurs, and there are productivity gains in the newly emerging private sector. This assumpion echoes the finding in Coricelli and Jazbec [2001], according to whom the real exchange rate behavior is influenced by structural reforms at the beginning of transition, but this influence diminishes over time, and its dynamics can be assimilated to that of previously acceding countries such as Spain, Portugal, and Greece.

Furthermore, it is reasonable to assume that demand shocks are very much conditioned by the nature of the monetary regime, whereas supply shocks are reflect the process of transition towards the market, as argued above. Distinguishing demand from supply shocks is therefore very important, since the former are likely to reflect an endogenous process where the similarity of demand shocks is the very product of the alignment of CEECs monetary policy on the EU monetary policy, while the latter are informative about

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[29] For previous similar studies, see Boone [1997], Boone and Maurel [1999], Horvath [2001].

whether CEECs are still facing asymmetric shocks before entering the monetary union (once the convergence process has resumed). Therefore we take into account the fact that countries that share a common policy are likely to display the same (endogenous) pattern of demand shocks as in the EU, while supply shocks are more likely to reflect productivity gains occurring only in transition countries, that is, to generate a certain level of asymmetry between EU member countries and CEECs. Babetski J and alii [2002]'s methodology consists of two steps.

1) Following the methodology of Bayoumi and Eichengreen [1996], demand and supply shocks are estimated with a VAR model for the accession countries, United States and the aggregate EU-15 as alternative benchmarks. Because the sample largely covers the transition period, one expects the correlation coefficients between countries to be rather weak for both types of shocks [Horvath, 2001].

2) In a second step, following Boone (1997) time-varying estimation (Kalman filter) allows to compute "time-varying correlation coefficients". More formally, the time varying $a(t)$ and $b(t)$ coefficients in equation (1) are estimated, and their evolution is analysed over time:

$$X_{EU} - X_{CEECs(i)} = a(t) + b(t) \cdot (X_{EU} - X_{US}) \qquad (1)$$

For a convergence process to be at work, both $b(t)$ and $a(t)$ must tend towards zero, as this will mean that the shock $X(CEEC(i))$ is entirely explained by the reference (EU) shock. Furthermore, the more $b(t)$ diverges from zero and tends towards one, the more important the rest of the world is (here proxied by the United States) in contributing to the shocks affecting the eastern country.[30]

The results show that supply shocks coefficients $b(t)$ increase or remain stable over time as long as the transition process evolves; for demand shocks, $b(t)$ start from a relatively high level, and then decrease over time as the monetary integration deepens. This means that demand shocks in the candidate country and reference country are getting closer and therefore can be addressed by a common monetary policy, while supply shocks have to be addressed through internal adjustments.

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[30] For details on the VAR methodology, see Bayoumi and Eichengreen [1996] and Boone and Maurel [1998]; for details on the application of the Kalman filter to this analysis, see Boone [1997}.

**Supply shocks, convergence to the EU** (0 = convergence, 1 = divergence)
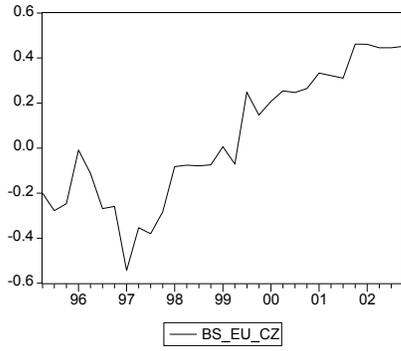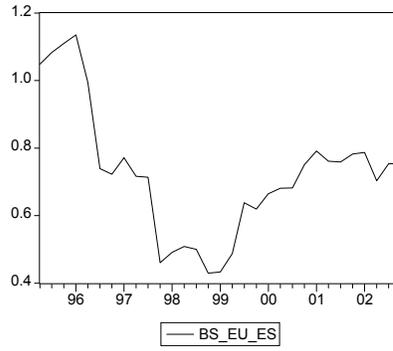
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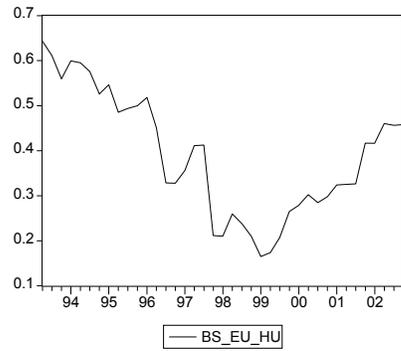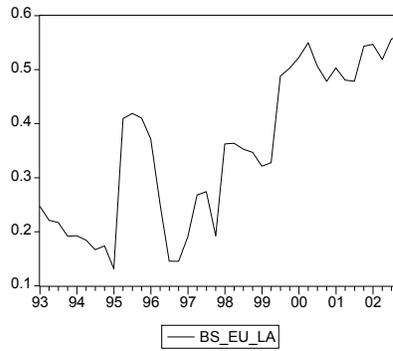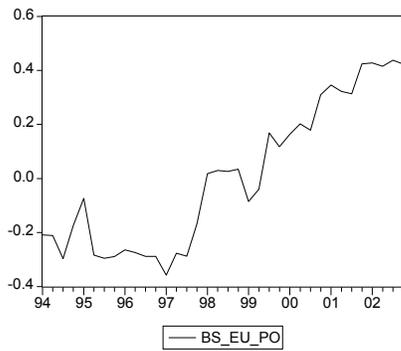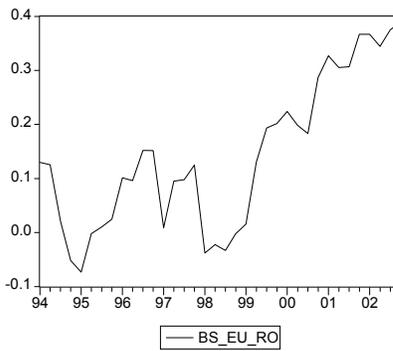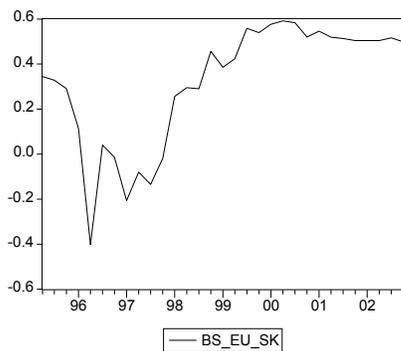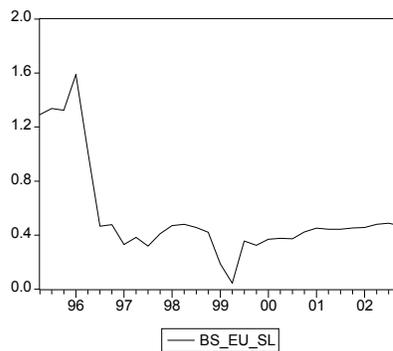
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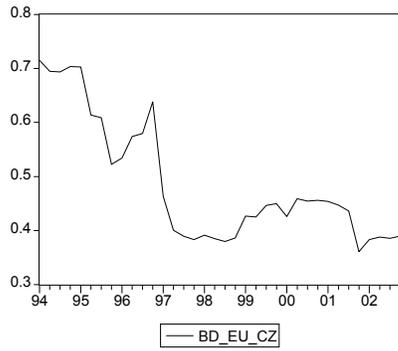
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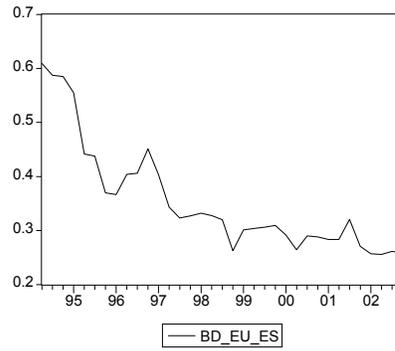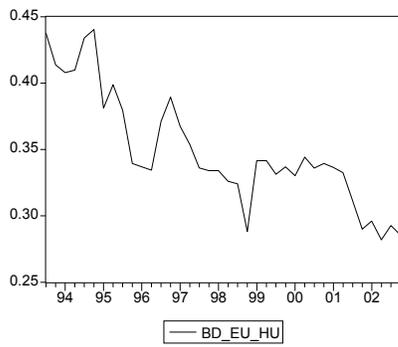
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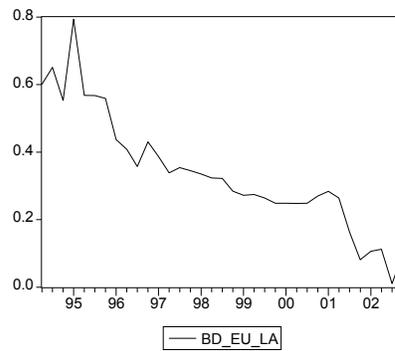
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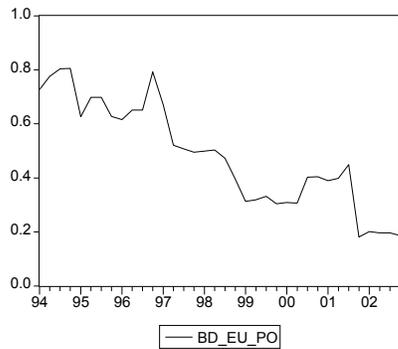
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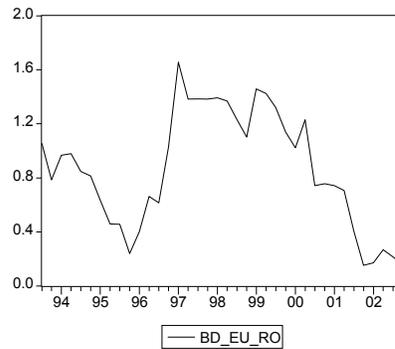
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Supply shocks, convergence to Germany (0 = convergence, 1 = divergence)
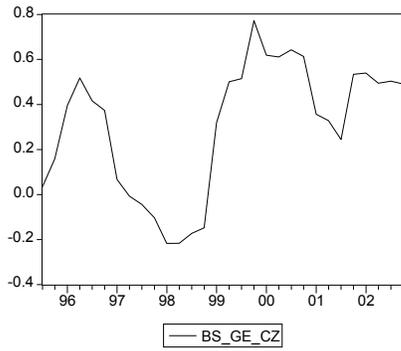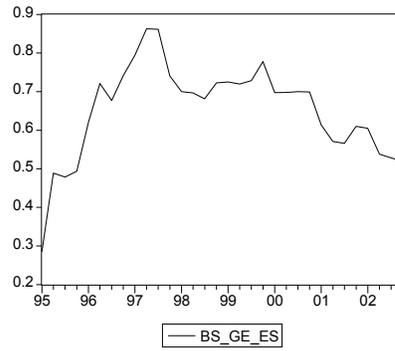
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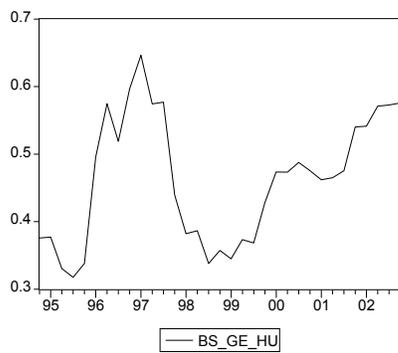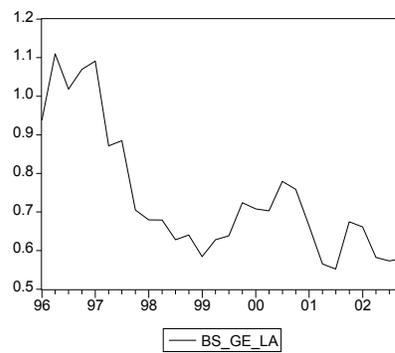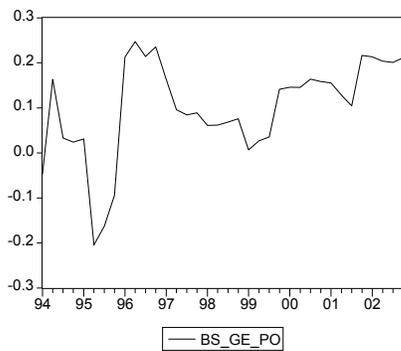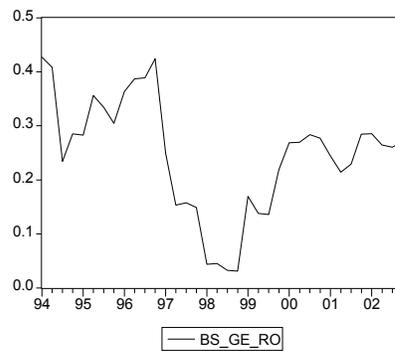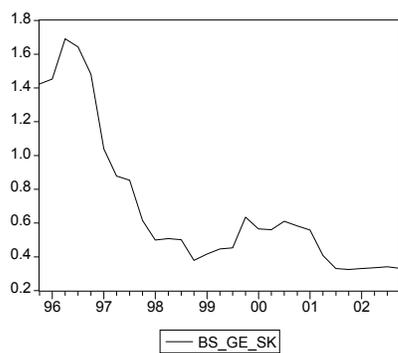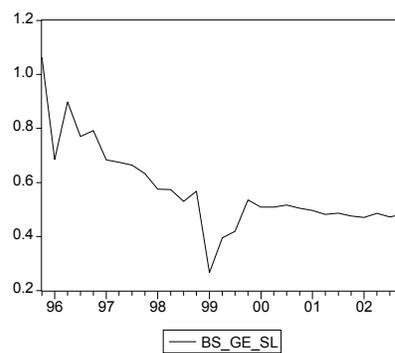
**Demand shocks, convergence to Germany** (0 = convergence, 1 = divergence)


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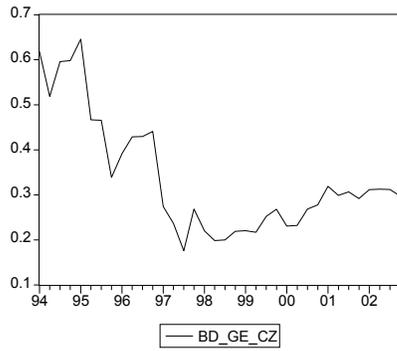
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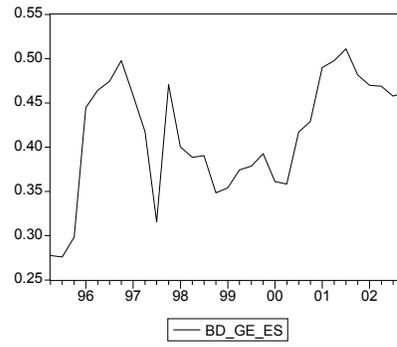
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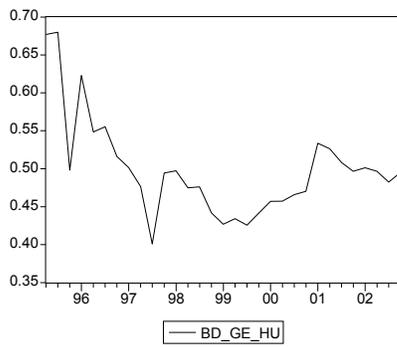
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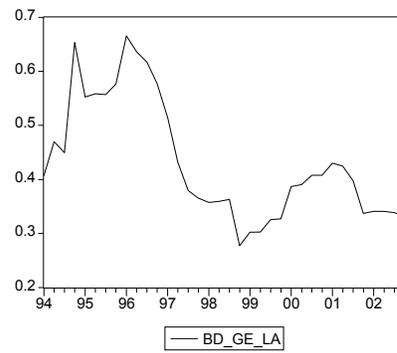
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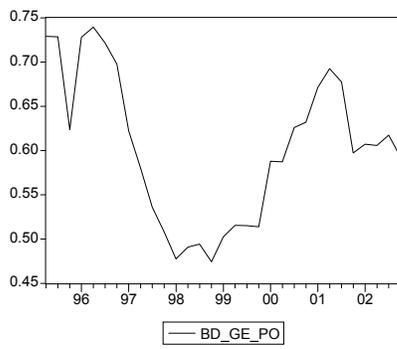
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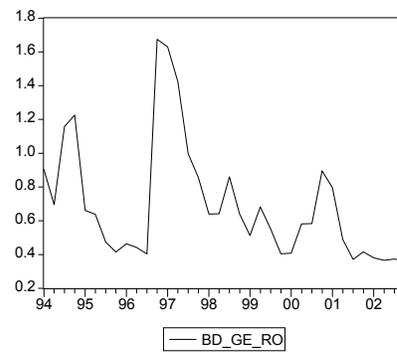
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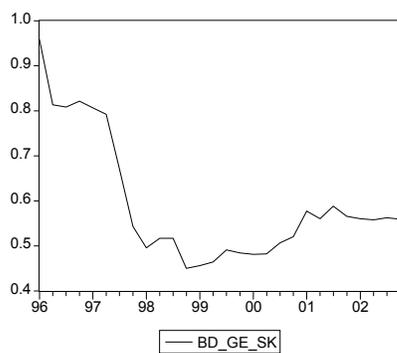
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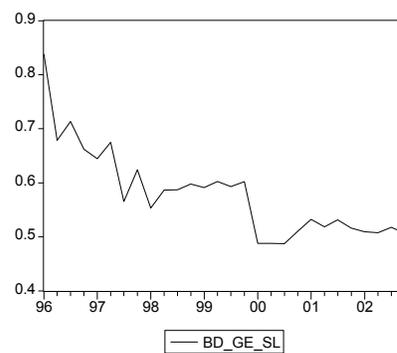
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