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AND SUPPLY SHOCKS ASYMMETRY:
THE CASE OF THE ACCESSION
COUNTRIES**

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ABSTRACT

Exchange Rate Regimes and Supply Shocks Asymmetry: The Case of the Accession Countries*

This Paper reviews the pros and cons of an early EU enlargement towards Central and Eastern European Countries (CEECs hereafter). First, the Maastricht criteria, which cannot be literally assessed during the catching up process, but that nevertheless mirror the huge efforts undertaken in order to (i) stabilise the economies, (ii) converge towards the EU, and then (iii) participate into the EMU, are analysed. Second, real convergence is observed to occur at different rates, depending upon the initial conditions faced and the productivity gains realised by each country. Third, computing the correlation of demand and supply shocks in a wide sample of Euro countries and the CEECs, gives some indication of the similarity of the business cycles and economic structures of the CEECs on the one hand, and the EU on the other. Yet, we argue that looking at static correlation only (averaged over the last decade) is too simplistic, as the transition process will blur these averages. Using the Kalman filter, we are able to compute time varying correlation, hence differentiating between the transition and the most recent period. Our results emphasise an ongoing process of demand shocks convergence, but supply shocks divergence. Various exchange rate strategies are then discussed.

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Keywords: EU enlargement, exchange rate regimes, Kalman filter and OCA (optimal currency area) criteria

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1. Introduction

EU enlargement towards the East is unprecedented : First, the situation of the CEECs is very different from that of the previous entrants into the EU (Spain, Portugal, Greece for example): not only the average GDP per head is lower, but also institutional underdevelopment and immaturity of Eastern financial and banking sectors¹, although progress has been made in those areas, enlarge the gap between the CEECs and the EU countries. Secondly, should the CEECs enter the EU in 2004, the delay between formal candidacy and actual admission would be exceptionally short. More generally, the wide range of possible macro-economic situations, both in terms of growth and inflation, may raise questions regarding the opportunity of a common policy mix.

It is then an unprecedented enlargement, whose different conditions might be, at least at first glance, contradictory : Maastricht criteria are not compatible with catching-up objectives, because nominal exchange rate stability implies an inflation higher than the average of that of the best three countries, as long as countries' growth rates are higher than the European average. Catching-up is not only measured in terms of macro-economic aggregates, it has also an institutional dimension that, while harder to evaluate, might be essential. Thus, according to Jürgen Kröger and Denis Redonnet (2001): "Compliance with the Copenhagen criteria takes precedence over compliance with nominal convergence criteria, and therefore EMU participation, for at least two reasons. First, greater progress towards real and structural convergence should take place ahead of nominal convergence, even though the two can be mutually supportive. Second, only countries that are functioning market economies capable of coping with competitive pressures can be assessed for nominal convergence; that is, the Maastricht criteria must be applied to "comparable economies"."

Copenhagen criteria are harder to assess than Maastricht criteria. Besides, they are much more likely to be affected by accession itself than macro-economic criteria (even though recent literature on OCAs has largely proved the endogenous nature of nominal and real convergence criteria, of financial and economic integration, and of the degree of symmetry of the shocks²). That is why our purpose here is not to review all the necessary conditions for the enlargement to be successful, but rather to focus on a subset of macro-economic criteria. When joining the EU, the CEECs will have to adopt the "acquis communautaire", part of

¹ See Erick Berglöf and Gérard Roland (1998), Jérôme Sgard (1995a), (1995b).

which is the EMU, if not the euro itself, whether in the short or medium term³. Although this does not mean that Maastricht criteria are required in the meantime, it implies convergence and stability along these lines⁴. Moreover, nominal convergence is a necessary (although not sufficient) condition for real convergence to take place, and the very similarity in terms of GDP per head and GDP volatility can serve as an additional criterion to see whether joining the same economic area is in each country's interest. Finally, sharing the same monetary policy is not only a matter of GDP levels, but also of business cycles similarity. Assume that two countries, A (in the core, rich) and B (peripheral and poor), have the same business cycle around a trend which is completely different: they can share the same monetary policy, while the real exchange rate can adjust to changing economic circumstances and shocks, not through changes in the nominal exchange rate, but through changes in wages and prices.

This paper reviews and documents the *pros* and *cons* of the CEECs joining the EMU. Section 2 examines how the CEECs perform with regards to the traditional Maastricht criteria, as well as the evolution of their current account, and its direct impact on the exchange rate. Although not required for eastern candidates to be eligible, these criteria allow a distinction between two groups of countries, those where a sound macro-economic environment has already emerged, and where the process of catching up is already at work, and those who still experience large imbalances, hyperinflation, and where the convergence process is lagging. In the long run, fiscal discipline is a good thing as well, for two complementary reasons. First, controlling public expenditures should lead to a better allocation of funding; second fiscal discipline yields lower interest rates, and also helps stabilising inflation expectations. Nominal convergence has favoured real convergence in term of GDP per head, simply because economic recovery cannot occur without stabilisation. The second set of criteria is therefore that of real convergence, and section 3 again emphasises two “types” of countries which have to be clearly separated for analytical purposes: those who would benefit in terms of catching-up from anchoring their money to the euro for stabilisation purposes (Bulgaria and Romania), and those who have the option of keeping their monetary

² See Frankel and Rose (1998).

³ See Agenda 2000, Strategy for Enlargement Document, Report on the progress made by every candidate country on their way to accession, European Union Bulletin, Supplement 3/2000, p. 28 : “The Economic and Monetary Union (EMU) is an essential part of the « *acquis* ». It is however convenient to distinguish clearly between participation into EMU – compulsory for all member states- and participation in the euro”.

⁴ This is similar to the non EMU countries (the UK, Denmark and Sweden) presenting a “convergence programme” along the EMU countries Growth and Stability Pact.

and exchange rate policy independent, because the toughest part of the stabilisation process has already been done. For these two groups the rationale behind euroization or participation in the EMU is therefore different. In Section 4, using the OCA approach as operationalised in Bayoumi and Eichengreen (1996), we try to identify countries for which a common monetary policy is a useful stabilisation tool from those for which the costs would outweigh the benefits. Policy implications regarding the exchange rate strategies for EU candidate countries are drawn in the conclusion.

2. “Enlarged” Maastricht criteria revisited

According to the recent (April 2001) summit of Nice, the CEECs are supposed to join the EU in a very near future, no later than 2005, which means, subsequently, EMU membership. EU admission requires candidate countries to have achieved “the Stability of institutions guaranteeing democracy, the rule of law, human rights, and respect for and protection of minorities; The existence of a functioning market economy, as well as the capacity to cope with competitive pressure and market forces within the Union; The ability to take on obligations of membership, including adherence to the aims of political, economic, and monetary union.” For the latter aims, namely that of economic and monetary union, the institutional Maastricht criteria were designed for selecting EU countries that were deemed fit to share a common currency:

- Inflation should be low, within 1.5% of the average inflation rate of the three countries with the lowest rates over the past two years;
- Long-term interest rates must be within 2% of the three lowest interest rates in EU;
- Exchange rates also have to be stable, within the 15% ERM bounds for at least two years;
- Budget deficit and public debt should not be higher than 3% and 60% of GDP respectively, and declining for the latter.

Those criteria were designed to minimise inflationary pressure in the common currency zone towards the “best practice countries” and for avoiding free riding behaviours (i.e. importing low inflation, and hence low interest rates, without having a sound fiscal policy), which would be unsustainable beyond the short term. Applied to the CEECs, these criteria lead to distinguish two subsets of countries: Romania and Bulgaria on the one hand, the rest of the CEECs on the other. Table 4 in Annex 1 reflects the sustainability of the current account, persistent deficits reflecting a need for increasing financing that could endanger, among others, the stability of the exchange rate and interest rates, hence putting at risk the macro-economic balance of the country.

[Insert Table 1 (a), Annex 1]

For Romania and Bulgaria, stabilisation is far from completion, with inflation mainly reflecting the monetary financing of the deficit. For Bulgaria, the data clearly show the 1997

hyperinflation process, which ended up with the implementation of a currency board. In Romania, prices were regulated until 1996, when liberalisation resulted in a jump in the inflation rate.

In other countries, inflation rates are often two-digit, well above the levels required by the Maastricht criteria, except for the Baltic States, the Slovak republic (to a lesser extent in the recent years), Slovenia, and the Czech republic, where it is one digit. Furthermore the trend is that of a decrease in inflation, from 28,2% in 1995 in Hungary, to an estimated 10,1% in 1999. It is also worth noticing that while the average inflation for the euro was 1,4% in 1999, and the best three EU countries averaged 0,6%, the figures for the Baltic States reveal very low inflation levels by historical EU standards (3,3% in Estonia; 2,4% in Latvia; and 0,8% in Lithuania). For the years 1998, 1999, and 2000, the CEECs averages are single digit, at respectively 8,7%, 5,3% and 6,4%. Amongst the best performers, the Czech republic employed a monetary policy based on keeping the nominal exchange rate stable up to the crisis in 1997, and from then onwards moved to a policy of inflation targeting, where *de facto* the korona proved to be quite stable⁵. The three Baltic States implemented either a credible and long lasting pegging to the DM, or even a currency board in Estonia, while in Hungary or Poland, the exchange rate regimes are more flexible: Hungary adopted a fixed peg, with small adjustments every year (which take into account the inflation differentials between Hungary and the countries in the reference basket) and Poland also has a crawling peg.

[Insert Table 1 (b-c), Annex 1]

Interest (lending and deposit) rates are quite high, far above the level of EU countries. This reflects more the difficulties encountered in implementing a competitive and efficient banking and financial system by these countries, which have to address a persistent problem of moral hazard and adverse selection, than the high level of inflation rates. In the Czech Republic for instance, the persistence of high interest levels while inflation declined contributed to boost commercial banks profits and to improve their capital position. Besides, once a country decides to implement a fixed exchange rate regime, and inflation and interest rates are high, interest rates in real terms are likely to fall below the European average (and

⁵ For an excellent overview of the evolution of monetary policy in transition economies, see Brada and Kutan (2001).

even to become negative). The monetary conditions index (MCI) measures the expansiveness of interest rates; in a restructuring economy in which the hardening of the budget constraint is essential, an overly expansive policy is not desirable.

[Insert Table 1 (d-e), Annex 1]

Public and debt deficits finally are rather unstable, but at levels which remain compatible with the 3% and 60% ratio of GDP criteria⁶. In the case of transition countries, one may fear that the low level of public debt observed at the beginning of the nineties was underestimated and could increase sharply in the following years. However the data do not support such an hypothesis: the trend is continuously decreasing down to 33,2% in 1998 (and the estimate for 1999 is 35,2%), that is half of the EU average. The debt's decline in Hungary, from 79% in 1992 down to 60,7% in 1999 (estimate), is particularly spectacular, and it is worth noticing that the Hungarian debt, as a percentage of GDP, has been akin to the EU's since as early as 1996. The evaluation of fiscal convergence in Baltic States by Kutan and Pautola-Mol (2001) emphasises similarly the impressive fiscal performance of these three transition countries by Western European standards. Halpern and Nemeyi (2001)'s opinions are much more reserved. The authors consider that the consolidation programmes required for greater transparency (in the Czech Republic, for instance) – the lack of which draws a veil of doubt on official statistics interpretation – or the problems associated to structural adjustments (in Poland, for instance), could explain a deterioration of tax revenue in the coming years. The « snowball »effect, according to which sustained growth allows to finance debt increases at lower costs, has probably helped the CEECs during the '90s (as was the case of Ireland), but could harm them in the following years if a growth slowdown occurred.

[Insert Table 1 (f) and Table 2, Annex 1]

Table 2 shows that the countries that achieved stability by anchoring of their currency are later able to switch to more flexible regimes. Such is the case of the Czech Republic,

⁶ The question of the optimal level of deficit in the CEECs is controversial. Although it can be argued that public expenditures do contribute to enhance growth, at least in the short run, we believe that this is not true for the majority of transition countries, where the soft budget constraint still holds, particularly in the state sector. Secondly the evidence for developing countries is that the level of public expenditures is negatively correlated with that of growth; see Havrylyshyn, Izvorski, and van Rooden (1998); Havrylyshyn, van Rooden (2000); and De Melo and alii (1996).

Hungary, Poland, Romania and Slovakia. This suggests that the cost of loosening the option of a counter-cyclical policy is higher for middling countries, “which are in an intense process of structural change whose outcome is difficult to predict, and which might therefore need some flexibility in their real exchange rate for some time” (Gros, 2000). But for very strong countries, including Estonia, who fulfils the Maastricht criteria by means of a currency board, and for very unstable and emerging-market countries, like Romania and Bulgaria, unable to engage in counter-cyclical monetary stabilisation policies, the cost of pegging the currencies might be lower. Table 1 (f) (Annex 1) reports the average and standard deviations of exchange rates since the beginning of the transition, over two years. It can be seen that the exchange rates have stabilised, and they fluctuate inside a relatively narrow band, that becomes narrower the further the transition process goes along.

3. Real convergence criteria

If nominal convergence is a necessary pre-requisite for economic recovery to occur, it is far from sufficient. The literature on the impact of stabilisation and of “good” policies on growth firmly establishes the link between inflation, domestic credit increases and budget deficit (which correspond exactly to the Maastricht criteria we looked at in the previous section), and economic performance, even if during the early years stabilisation might cause a significant slowdown. But what really matters for stabilisation to be sustainable is to introduce measures aiming at liberalising the economy such as internal and external prices liberalisation, privatisation, abolition of former state controls, and so on. De Melo and alii (1996) proposed the first indicators of liberalisation which have been further extended by the EBRD. Relying upon those indicators, they show that while macro policy explains a significant part of the growth variance, structural reforms matter more, accounting for about 70% of the variance of growth. Hence nominal convergence is not at odds with real convergence, but it is far from sufficient.

This is why we look at real convergence, which is an ex post indicator of the success of reforms and transition towards market based economies. We present two criteria: the convergence in terms of GDP per head, and the sigma convergence, which measures the evolution of the dispersion of GDP growth rates across countries.

Figures 1 to 3 (Annex 1) distinguish three groups of countries. First, the CEECs, who display the highest GDP to German GDP per head ratio, with the more spectacular evolution for Slovenia (the ratio was slightly above 25% in 1992 and approached 40% in 1999). Then the Baltic States, that show a higher convergence rate (which is to be expected from a lower level), the GDP per head in percent of that of Germany being multiplied by a factor of seven over the period, up to 12% of Germany's GDP by 1999. On the other hand, Romania and Bulgaria do not exhibit any sign of convergence, being characterised by a highly unstable growth path. The convergence path mirrors a phenomenon of real appreciation, implied by undervalued exchange rates at the starting date, with lower or even negative GDP growth rates, and then productivity gains taking over and yielding higher growth over the most recent period.

[Insert Figures 1 to 3, Annex 1]

Another important element is whether the examined countries tend to have similar GDP growth rates evolution. Increasing dispersion in the GDP behaviour would be at odds with a common monetary policy. This is what sigma convergence measures⁷: a group of countries is said to sigma converge when the variability of GDPs per head is being reduced. There is some evidence that this is the case in our group of countries. Between 1992 and 1996, the variability of GDP across countries decreases from 36% to 21%. Moreover, if we exclude Romania and Bulgaria, the decline is even more impressive, beginning from 31% and down to 15%.

[Insert Table 3, Annex 1]

By analysing nominal and real criteria we distinguish two sets of countries, that can even be considered independently from the issue of EU accession: those⁸ that have respected a certain road for macro-economic and structural adjustment and thereby succeeded in stabilising their economy on the one hand, and those which failed to implement such policies and still display high inflation rates, high interest rates, unstable exchange rates and large imbalances. For the latter set of countries, Bulgaria and Romania, fixing the nominal

⁷ For a more formal definition of sigma convergence, see Boone and Maurel (1998).

⁸ Namely the Czech and Slovak republics, Poland, Hungary, Slovenia, and the Baltic States.

exchange rate, or even setting up a currency board must be part of an entire stabilisation programme. The cost of non stabilising is huge, but the logic here is far from that of converging towards the Maastricht criteria. For the former, keeping in mind that EU accession requires the ability to take on membership obligations, including adherence to the aims of monetary union, the cost of strongly pegging the currencies to the euro should be assessed.

4. OCA criteria

Even if Maastricht criteria are not going to be applied literally to CEECs, entering the EU requires very low inflation and exchange rate variability, while the higher than EU average growth and the restructuring process itself are likely to create inflationary differentials and exchange rate variability. The latter would justify a monetary policy and exchange rate policy aiming at accommodating the adverse consequences of real appreciation and inflationary pressures⁹, and pleads against participating into the EMU in a near future; CEECs would be better off waiting until most of the restructuring process is over. A recent paper by Coricelli and Jazbec (2001) provides evidence that the real exchange rate behaviour is well influenced by structural reforms¹⁰, at least at the beginning of transition. Nevertheless this influence diminishes through time, and finally stabilises 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 again, if 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 member of the EU currency union (the same question was asked for Portugal, Spain and Greece when they were candidates). In what follows, we show

⁹ Productivity gains in the tradable sector imply inflation in the non tradable sector through the Balassa Samuelson effect.

¹⁰ which are measured by the ratio of the workers employed in manufactured on the number of workers employed in services, and instrumentalized by the well known structural reform index of De Melo, Denizer and Gelb

that the nineties are characterised by a level of supply and demand shocks symmetry (between EU and CEECs) quite comparable to the symmetry that prevailed between EU and previously acceding countries such as Spain and Portugal. A more worrying fact is that while demand shocks symmetry seems to decrease, the symmetry in supply shocks prevails; but this latter phenomenon may also be observed for countries such as Spain, Portugal, and even France.

4.1 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 countries¹¹. 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 stand for 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 addressing the adverse supply shocks of the transition towards a market economy, which rendered entire sectors non competitive. They consisted sometimes in huge devaluations (see Poland) to smoothen 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, and productivity gains in the newly emerging private sector.

On the other hand, one could also argue that this problem should be addressed in reverse: countries that share a common policy are likely to converge and display the same cycle, hence one should favour adhesion to EMU on the grounds that it will foster

(1996) and total credit to the private sector (EBRD Transition Report, 1999).

convergence. Our methodology can take into account this endogeneity and 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, Germany and the aggregate EU-15 as alternative benchmarks. Because the sample largely covers the transition period, we expect the correlation coefficients between countries to be rather weak for both types of shocks (Horvath , 2001).

2) In a second step, we pay attention to both the transition impact and the fact that OCA criteria fulfillment may be endogenous¹², i.e. that they are likely to be more satisfied as both monetary and trade integration deepens, owing to the process of adherence to the EMU. Indeed, the nineties have been characterised by a continuous increase in West-East integration, and in many cases the currencies were more or less pegged to the DM. These increases in both trade and monetary integration provide us with a natural experiment for testing the endogeneity process. Following Boone (1997) we use time-varying estimation (Kalman filter) to compute “time-varying correlation coefficients”, and expect that the path of these coefficients will mirror a convergence process at work. More formally, we estimate time varying $a(t)$ and $b(t)$ coefficients in equation (1), and analyse their evolution over time:

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

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 (Germany or EU) shock. Furthermore, the more $b(t)$ diverges from zero and tends towards one, the more important is the rest of the world (here proxied by the United States) in contributing to the shocks affecting the eastern country. Intuitively, we would expect $b(t)$ to start from a relatively high level, and to decrease over time as the transition process evolves. Ultimately, this would mean that both the shocks in the candidate country and reference country are getting closer and therefore can be addressed by a common monetary policy.¹³

¹¹ For previous similar studies, see Boone (1997), Boone and Maurel (1999), Horvath (2001).

¹² As argued by Frankel and Rose (1998) and Boone and Maurel (1998).

¹³ 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).

4.2 Data

For running the VAR model we used real GDP in national currencies and GDP deflator. Our sample is made of six developed countries (Denmark, France, Germany, Portugal, Spain and the United States), for whom yearly and quarterly time series are available. It covers the period 1960 – 2000. Both yearly and quarterly data are seasonally adjusted by the OECD.

We add to that core sample ten EU accession countries: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. For those countries the data are quarterly, from 1990 up to 2000. The sources are mixed: OECD, IMF and national statistics. While OECD data are already seasonally adjusted, we had to adjust the remainder by applying the U.S. Bureau of Census' X12 procedure (the same approach as used by the OECD).

4.3 Results

Comparing the results based upon yearly and quarterly frequency allows to select the “optimal lag length” for eastern countries in the VAR analysis, for whom only quarterly data are available. The results in Boone (1997), who extracts demand and supply shocks for EU countries using a two-lag VAR process, are used as a benchmark. As can be seen in Annex A, six or eight lags deliver a similar output as two lags for yearly data. In subsequent analysis, although the marginal cost of adding a lag is high given the short time span, we will present results based upon eight lags, equivalent to two years¹⁴.

This approach should be taken with great care. First, the sample sizes are small, hence complicating the task of econometrics. Second, quarterly data are very informative, but can also be noisy. Thirdly, although a deeper convergence process may be at work, it might be too recent and/or too weak to be captured by an econometric estimation. Hence, our analysis is based upon the following definitions: we consider that (i) a process of convergence is at work if $a(t)$ is constant and close to zero and $b(t)$ declines over the period; (ii) convergence is weak if either (ii_a) $a(t)$ is constant but not necessarily nil, and declines towards zero or (ii_b) $b(t)$ shows signs of decline at least over the latest part of the sample, or has shown signs of decline

¹⁴ Results based upon 6 lags are available in Annex A. Qualitatively they do not differ from results based upon 8 lags, but they are often less clear-cut.

but most recent observations departing; (iii) the pattern is unclear when we observe for either $a(t)$ or $b(t)$ an erratic pattern, although the trend for $b(t)$ is downwards; and (iv) there is no convergence (there is divergence) in all other cases.

Finally, assessing whether pegging the currency is a good option can be asked in absolute terms, but also in relative terms, by comparing the “optimality” of pegging for candidate and (southern) EU member countries¹⁵, like Spain and Portugal, at the time when they were entering the EU (before and after 1986), and in the nineties.

Results are reported in Annex B for Portugal and Spain and Annex C for CEECs. Overall, it turns out that distinguishing any clear pattern is quite a difficult task on a period of time so short. While over two decades one observes that Portugal and Spain do converge towards Germany¹⁶ prior to their entry into EU in 1986, but not towards EU¹⁷, the long term relationships are less clear-cut over sub-periods (see Figure B1, Annex B). In spite of the difficulty of identifying supply and demand cycles in a ten year interval, these results imply that joining the EU does not necessarily mean convergence of business cycles. In Spain, supply shocks $b(t)$ coefficient is increasing over 75-85, and even more over the last decade. The average is set equal to 0,09 before entry, and jumps up to 0,27 in the nineties. In Portugal, the average $b(t)$ is higher, respectively 0,65 and 0,61, and $b(t)$ is slightly decreasing from 1975 up to 1986.

CEECs convergence over the last period is more clear-cut from the demand side than from the supply side. This is not surprising, given that the shock of transition towards a market economy affected transition countries but obviously not EU countries. Thus, by comparing tables C1 and C2 in Annex C, it can be seen that the average of $b(t)$ coefficients in the supply shocks convergence to the EU equation is, in four of the eight countries in the sample, below the average of the same coefficients in the convergence to Russia equation. With regards to demand shocks convergence, CEECs do converge more clearly towards the EU : (i) while $a(t)$ coefficients are close to zero, the average of the $b(t)$ coefficients is not higher than the Spanish or Portuguese values when these countries were candidates¹⁸ ; (ii) $b(t)$

¹⁵ Whose economic structure and specialisations are similar.

¹⁶ See Annex B, Table B2 and Annex A, Figure A1.

¹⁷ The same result was already pointed out in Boone (1997).

¹⁸ They are not higher than Spanish or Portuguese values over the nineties.

coefficients in the demand shocks convergence to the EU equation are almost systematically below (excepting two out of eight cases : the Czech Republic and Poland) these same coefficients in the convergence to Russia equation ; (iii) finally figures C1 show the dynamics of $b(t)$ coefficients in the demand shocks convergence to the EU equation, that in the cases of the Czech Republic, Poland, Slovenia and Latvia, is a convergence dynamic. Therefore, if supply shocks convergence is rather loose, demand shocks are increasingly synchronised with EU demand shocks. This might be linked to the strategy of accession undertaken by many CEECs, who have been able to achieve some measure of convergence between the evolution of their money stock and that of Germany, as shown in Brada and Kutan (2001).

Overall, countries achieve higher level of convergence when they commit towards fixing their currencies: both supply and demand shocks are converging towards EU shocks in Estonia and Latvia. For the latter Kutan et Pautola-Mol (2001) measure cyclical sensitivity of State's budget to business cycle, and conclude that « evidence on the cyclical sensitivity of the Baltic States suggests that the Stability and Growth Pact [...] would offer enough room for automatic fiscal stabilizers in Estonia and Latvia ».

4.4 Exchange rate strategies for EU candidate countries

The Czech and Slovenian cases are interesting because, while supply shocks are clearly divergent, demand is increasingly explained by European demand shocks. The latter reflect temporary shock with no long run effect on output and prices. The alignment of exchange and monetary policies on Germany, or on a wider scale the EU - the adoption of fixed exchange rate regimes, the anchoring on German monetary aggregates indicators as shown by Brada and Kutan (2001) - could be at the origin of this convergence process. Concerning supply shocks, that correspond to the more structural side of the economy, the transition process itself, that is convergence of the GDP per head towards the European level, consists in productivity shocks occurring only in the East. So there cannot be (and it is not desirable that there was) supply shocks convergence, as long as the catching-up of the GDP per head and productivity levels is not achieved.

Which exchange rate regimes are desirable for countries wanting to join the EU in the mean term ? Two of them are clearly incompatible with the admission agenda¹⁹, that implies notably that the exchange rate policy must be considered as a matter of common interest, and that, in the relatively short term, the newcomer country must apply the ERM2 functioning rules (exchange rates must not depart from central parity and their volatility must not exceed a 15% fluctuation band for at least two years). They are crawling pegs, and pegs against anchors other than the euro. Hungary still operates a crawling peg, and has announced a strategy of abandonment of the present regime. Other exchange rate regimes are compatible with the idea of ERM2 participation, conditioned to their credibility and to their ability not to put the catching up process of the CEECs at risk :

- *Currency boards* (and *unilateral « euroization »*) are possible as long as fiscal discipline is assured and prices and wages are flexible enough so as to maintain the inflation differential (resulting from the growth differential) below a critical level that would endanger the country competitiveness ; and also as long as the chosen peg is the euro (as is the case in Estonia, but not in Lithuania, where the anchor is the dollar, or in Latvia, where it is the SDR).
- The Irish example shows that a *fixed nominal exchange rate* does not curtail growth (one might even rather say the contrary). It must be noted that in this strategy the choice of the right conversion rate upon accession into the monetary union is essential, particularly when candidate countries have higher growth potentials than other member countries. An initial underestimation allows in fact a later real exchange rate appreciation, that in turn facilitates the absorption of the asymmetric supply shocks that were exposed in the preceding section. George M. von Furstenberg (2002) shows that “Balassa-Samuelson effects provide little reason for small countries to shun monetary union while they are catching up through fast MFP (Multifactor Productivity) growth to the slower-growing countries at its core unless their remaining catch-up potential is very large”. In other words, the inflation induced by the Balassa-Samuelson effect (that is, a price increase not proportional to the productivity gains

¹⁹ This agenda consists in four steps: “ (1) prior to accession no formal restriction on the choice of the exchange rate regime; (2) Upon accession, new Member states must adopt an exchange rate policy as a matter of common interest (Article 124); (3) After accession, although not necessarily immediately, join the EMR2; (4) After application of the procedure in the Article 121, the adoption of the rate at which the euro will be substituted for the currency of the Member State and start preparations to introduce the euro.”

because of the existence of a sector of non tradable goods) exceeds a critical percentage if the growth differential is high and sustainable. It is also unlikely higher among nations than among regions : Teolis et von Furstenberg (1993, pp. 259-261) show that when Mexico fixed its exchange rate in 1988, the volatility of the real exchange rate between Mexico and the United States did not exceed the one prevailing between the cities of Chicago and Los Angeles.

- *Managed float*, or *full float*, are also feasible options, but practice shows that candidate countries have either inflation targeting, or monetary aggregates targeting policies.

If the catch-up potential is very high, and therefore if the probability of asymmetric supply shocks remains high, and if prices are not flexible enough, then the definitive fixing of the exchange rate might not be desirable. In this case, simply joining the ERM2 is the best strategy, because it gives countries greater latitude for absorbing asymmetric supply shocks, it formally prepares them for the later stage of adopting the euro, and it corresponds to an explicit agenda to which all different parties involved agree upon. For Jürgen Kröger and Denis Redonnet (2001): “ERM2 could provide the framework for managing a flexible exchange rate, allowing for successful catching-up while maintaining a clear orientation towards nominal convergence – and the ultimate adoption of the euro”. Exchange rate are increasingly compatible with ERM2 functioning rules : Table 1 (f) shows that nominal exchange rate volatility computed over two years is decreasing on the one hand, and fluctuates around its mean (over the same period) inside a 15% band. If the conditions²⁰ for a credible Currency Board (or a unilateral “euroization”) are met, fixing the nominal exchange rate is even better because it shows that the candidate country is able to directly participate in the EMU during its catching up phase²¹. Another advantage of this strategy is to enhance credibility of EU membership candidate countries, by showing that they are willing to assume

²⁰ These extremely tight conditions are the reason why currency boards are introduced only in exceptional situations : Bulgaria sets one up in '97 in order to control inflation. Unilateral “euroization” corresponds also to extreme situations, like the one in Montenegro : DM, on november the 2nd 1999 (see Duchêne and alii (2000)).

²¹ Because it can absorb asymmetric shocks due to price and wage flexibility. Babetski (2002) shows that (i) wages are more flexible in the CEECs than in western European countries; (ii) wage flexibility explains in the Granger sense the exchange rate fluctuations. Countries with more flexible labour markets adopt less flexible exchange rate regimes. Data does not allow to test for reversed causality, but it can be conjectured that adoption of the euro would mean greater flexibility of the labour market.

the associated costs, and by providing incentives for EMU member countries to improve their engagements²².

Conclusion

Institutional criteria are at the moment unevenly satisfied by the CEECs. But those criteria are not formally required for them to enter the EU. The reason is that the current level of inflation partly reflects the transition process, and as long as the rate of growth in those countries is expected to be higher than in EU countries, keeping inflation at low levels and at the same time fixing nominal exchange rates simply makes no sense. The catching up process implies that CEECs can expect a 5 percent growth differential with current members, to be associated with a 2 percent inflation differential. For Daniel Gros, this inflation differential can reach 3 and even 4 percent.

Secondly, focusing on the similarity of business cycles and economic structures provides some encouraging signs of convergence, although a great deal of progress could be made in that respect. Nevertheless, even if the evidence that some of the CEECs are subject to shocks similar to the German or EU ones is rather weak, especially for the supply side, one should recall that the pattern of convergence was quite loose when Spain or Portugal were candidate²³. Hence the criteria of business cycle convergence should not be overemphasised.

Supply shocks are not clearly converging, which might be due to the Balassa Samuelson effect. The effect has been found to be especially relevant when an open economy not depending on primary resources is growing fast by changing industrial structure and export composition (Ito, Isard and Symansky, 1999, p. 126), which is exactly the case of CEECs. But the absence of supply convergence is not necessarily bad from the point of view of EMU memberships. Emerging countries, often unable to engage into counter cyclical

²² In this respect, the artificial distinction between currency boards and unilateral « euroization » shows that the decision of EU enlargement has an essential political dimension. Some pretend that while the former are compatible with the EU Treaty, the latter « do not respect the principles of EMU accession negotiations, do not respect the economic rationale of the Treaty and of accession. Finally the euro can become a given country's currency only when the Council takes the decision in keeping with the Treaty procedures.” At the opposite Gros (2000) pleads for “euroisation from the Atlantic to the Urals”.

²³ Their business cycles synchronism with EU does not turn out to be higher over the last decade.

policy²⁴, by fixing nominal exchange rate have simply to let productivity gains translate into inflation differentials *endogenously*. The latter, which are equilibrating and consistent with international competitiveness²⁵, are better than policy-induced differences in inflation rates that imperil the credibility of any exchange rate regimes, whatever fix or floating. “Both the empirical evidence and theory suggest that differences in excess of 4 percentage points of individual member countries’ annual inflation rates from the GDP-weighted average inflation rate for all such countries are unlikely. Furthermore, these differences tend to diminish over time and generally are smaller than the differences observed prior to the credible fixing of exchange rates in the run-up to monetary union.”²⁶

Demand shocks convergence is more clear-cut. This is in line with Brada and Kutan (2001), who show that CEECs were able to mimic ECB policies regarding the growth of their money base (allowing us by the way to interpret the inflation differential as simply reflecting the Balassa-Samuelson effect and the process of convergence itself). As a result, giving up monetary policy independence will not be so costly at the time of EU entry. It has been shown²⁷ furthermore that fiscal policy was able to smoothen business cycles, in the limits imposed by the Stability Pact and Maastricht criteria.

This paper reviewed and applied the classical OCA criteria to CEECs, which have been found to be qualified for entering soon the EU, as decided in Nice and Laeken. But it does not consider the institutional aspects of that enlargement, which could make it much more successful. What is worrying is that the current EU members do not show (at least up to now) a strong enough sign of implementing the necessary reforms to the EU budget and institutional operations. Yet, a date has been set and there are great expectations on the side of the CEECs. For the enlargement to be a complete success, conditions ensuring a more rapid convergence of the CEECs need to be put in place. This will not only benefit those countries, but also alleviate the implied burden for the existing EU members, allowing both sides to reap the full benefit of this experience.

²⁴ They *de facto* have followed the German Central Bank policy.

²⁵ As argued quite convincingly in von Furstenberg (2002).

²⁶ von Furstenberg (2002), p.17.

²⁷ For the three Baltic States, see Kutan et Pautola-Mol (2001).

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Annex 1

Table 1. Maastricht criteria applied to the CEECs

a) Inflation rate*** (% change, annual averages)											
	90	91	92	93	94	95	96	97	98	99*	00**
Bulgaria	26,3	33,4	82,0	73,0	96,3	62,0	12,3	108,2	22,2	0,7	7,0
Czech Rep.	9,7	52,0	11,1	20,8	10,0	9,1	8,8	8,5	10,7	2,1	3,9
Hungary	28,9	35,0	23,0	22,5	18,8	28,2	23,6	18,3	14,3	10,1	9,5
Poland	58,6	70,3	43,0	35,3	32,2	27,8	19,9	14,9	11,8	7,3	9,9
Romania	5,1	170,0	210,0	25,6	13,7	32,3	38,8	15,4	59,1	45,8	45,0
Slovakia	10,8	61,2	10,0	23,2	13,4	9,9	5,8	6,1	6,7	10,6	11,9
Slovenia	55,0	11,8	20,7	32,9	21,0	13,5	9,9	8,4	8,0	6,1	8,6
Estonia	23,1	211,0	107,6	89,8	47,7 ^c	29,0	23,1	11,2	8,2	3,3	3,8
Latvia	10,5	17,2	9,5	10,9	35,9	25,0	17,6	8,4	4,7	2,4	2,9
Lithuania	8,4	22,5	102,1	41,0	72,1	39,6	24,6	8,9	5,1	0,8	1,0
CEECs average excl. Romania and Bulgaria	153,4	118,1	417,8	92,9	31,4	22,8	16,7	10,6	8,7	5,3	6,4
Euro area average	4,5	4,7	4,6	4,2	3,4	3,0	2,5	2,0	1,4	1,2	2,2
EU average	5,2	5,6	4,5	4,1	3,3	3,1	2,7	2,1	1,6	1,4	2,1
"3 best EU" av. ****	3,1	3,4	3,6	3,2	2,7	1,8	2,0	1,7	0,8	0,6	1,7

Notes:

- *) Estimates
- **) Projections
- ***) CEECs: retail/consumer price level
Euro area and EU: private consumption deflator
- ****) Three "best performing EU countries" with lowest inflation in 1998 and 1999 are Austria, Germany and France

Sources: CEECs: EBRD Transition Report, 2000; authors' computations
EU average: OECD Economic Outlook, December 2000; authors' computations

Table 1. (continued) Maastricht criteria applied to the CEECs

b) Deposit rate (% per annum)											
	90	91	92	93	94	95	96	97	98	99	00*
Bulgaria	na	39,5	45,0	42,6	51,1	35,9	74,7	46,8	3,0	3,2	na
Czech Rep.	na	na	na	7,0	7,1	7,0	6,8	7,7	8,1	4,5	na
Hungary	24,7	30,4	24,4	15,7	20,3	26,1	22,2	18,5	16,2	13,3	na
Poland	41,7	53,5	37,8	34,0	33,4	26,8	20,0	19,4	18,2	11,2	14,2
Romania	na	na	na	42,5	49,5	32,4	38,9	34,1	42,3	41,3	na
Slovakia	na	na	na	8,0	9,3	9,0	9,3	13,4	16,3	14,4	na
Slovenia	na	682,5	153,0	33,0	28,1	15,4	15,1	13,2	10,5	7,2	10,0
Estonia	na	na	na	na	11,5	8,7	6,1	6,2	8,1	4,2	3,8
Latvia	na	na	na	34,8	31,7	14,8	11,7	5,9	5,3	5,0	4,4
Lithuania	na	na	na	88,3	48,4	20,1	13,9	7,9	6,0	4,9	3,9
CEECs average	33,2	201,5	65,0	34,0	29,0	19,6	21,9	17,3	13,4	10,9	7,2
"3 best EU" av. ***	8,0	7,4	7,3	5,9	4,6	5,3	3,4	2,7	2,5	1,9	3,0
Euro area average	na	na	na	na	na	na	4,1	3,4	3,2	2,4	3,4
EU-15 average	8,2	8,1	7,7	7,0	5,8	5,5	4,3	3,6	3,7	na	na

c) Lending rate (% per annum)											
	90	91	92	93	94	95	96	97	98	99	00*
Bulgaria	na	48,4	56,7	58,3	72,6	59,0	123,5	84,0	13,3	12,8	na
Czech Rep.	na	na	na	14,1	13,1	12,8	12,5	13,2	12,8	8,7	na
Hungary	28,8	35,1	33,1	25,4	27,4	32,6	27,3	21,8	19,3	16,3	na
Poland	504,2	54,6	39,0	35,3	32,8	33,5	26,1	25,0	24,5	17,0	20,0
Romania	na	na	na	86,4	61,8	47,5	53,6	55,6	58,9	62*	na
Slovakia	na	na	na	14,4	14,6	16,8	13,9	18,7	21,2	21,1	na
Slovenia	na	824,6	195,1	48,6	38,9	23,4	22,6	20,0	16,1	12,4	15,8
Estonia	na	na	30,5	27,3	23,1	16,0	13,7	19,8	16,7	8,7	7,6
Latvia	na	na	na	86,4	55,9	34,6	25,8	15,2	14,3	14,2	11,9
Lithuania	na	na	na	91,8	62,3	27,1	21,6	14,4	12,2	13,1	12,1
CEECs	266,5	240,7	70,9	48,8	40,2	30,3	34,1	28,8	20,9	18,6	13,5
"3 best EU" av. ****	14,8	14,1	13,9	11,4	9,2	9,6	7,3	6,1	5,4	4,7	na
Euro area average	na	na	na	na	na	na	8,9	7,6	6,7	5,7	na
EU-15 average**	14,5	14,3	14,2	12,2	10,5	10,2	8,8	7,9	7,5	na	na

- Notes:*
- *) Estimates
 - **) Data for Austria are unavailable till 1998
 - ***) In 1998 and 1999: Austria, Spain and Sweden
 - ****) In 1998 and 1999: Finland, Spain and Sweden

Sources: CEECs except Romania: IMF International Financial Statistics, March 2001; authors' computations
Romania: EBRD Transition Report, 2000
Euro area average: IMF International Financial Statistics, March 2001
EU-15 average: WB Global Development Finance, 2000

Table 1. (continued) Maastricht criteria applied to the CEECs

d) Public balance (% GDP)											
	90	91	92	93	94	95	96	97	98	99*	00**
Bulgaria	-8,1	-4,5	-2,9	-8,7	-3,9	-5,7	-10,4	-2,1	0,9	-0,9	-1,5
Czech Rep.	-0,2	-1,9	-3,1	0,5	-1,1	-1,4	-0,9	-1,7	-2,0	-3,3	-4,2
Hungary	0,0	-3,0	-7,2	-6,6	-8,4	-6,7	-5,0	-6,6	-5,6	-5,6	-3,6
Poland	3,1	-2,1	-4,9	-2,4	-2,2	-3,1	-3,3	-3,1	-3,2	-3,3	-3,0
Romania	na	na	-4,6	-0,4	-2,2	-2,5	-3,9	-4,6	-5,0	-3,5	-4,0
Slovakia	na	na	-11,9	-6,0	-1,5	0,4	-1,3	-5,2	-5,0	-3,6	-3,3
Slovenia	na	2,6	0,3	0,6	-0,2	-0,3	-0,2	-1,7	-1,4	-0,9	-1,0
Estonia	na	na	na	-0,7	1,3	-1,3	-1,9	2,2	-0,3	-4,6	-1,2
Latvia	na	na	na	na	-4,4	-3,9	-1,8	0,3	-0,8	-4,2	-2,7
Lithuania	na	na	na	-5,3	-4,8	-4,5	-4,5	-1,8	-5,8	-8,6	-3,3
CEECs average	-1,3	-1,8	-6,4	-3,1	-3,0	-3,0	-3,1	-3,3	-3,4	-3,6	-2,8
Euro area average	-4,5	-4,6	-4,8	-5,6	-5,0	-5,0	-4,3	-2,6	-2,2	-1,3	0,3
EU average	-4,0	-4,3	-5,3	-6,3	-5,6	-5,4	-4,3	-2,5	-1,6	-0,8	0,7

Notes: *) Estimates
 **) Projections

Sources: CEECs: EBRD *Transition Report*, 2000; authors' computations
 Euro area and EU average: OECD *Economic Outlook*, December 2000

e) Public debt*** (% GDP)											
	90	91	92	93	94	95	96	97	98	99*	00**
Bulgaria	na	na	158,7	150,9	159,6	104,1	145,0	109,1	96,6	96,6	na
Czech Rep.	na	na	na	18,8	17,6	15,3	13,1	13,0	13,4	15,0	na
Hungary	na	na	79,0	90,4	88,2	86,4	72,8	63,9	62,3	60,7	na
Poland	na	na	147,3	88,7	72,4	57,9	51,2	49,8	43,2	43,3	na
Romania	na	na	na	na	na	17,6	28,1	28,0	28,0	34,6	na
Slovakia	na	na	na	31,5	28,0	24,6	24,5	23,7	26,0	28,4	na
Slovenia	na	na	45,6	21,1	18,5	18,8	22,7	23,2	23,7	24,6	na
Estonia	na	na	na	na	na	na	na	6,7	5,9	6,6	na
Latvia	na	na	na	na	14,1	16,1	14,4	12,0	10,5	13,8	na
Lithuania	na	na	na	na	na	na	na	21,1	22,4	28,4	na
CEECs average	na	na	188,7	102,6	75,1	57,9	53,2	40,6	37,6	39,2	na
Euro area average	58,4	58,3	61,8	68,3	70,7	73,4	74,4	74,0	73,4	72,2	na
EU-15 average	na	na	na	na	na	na	72,5	69,8	66,6	64,6	na

Notes: *) Estimates
 **) Projections
 ***) CEECs except the Czech republic: general government debt
 The Czech republic: public debt
 Euro area average: government debt
 EU-15 average: Maastricht definition of general government gross public debt

Sources: CEECs: EBRD *Transition Report*, 2000
 Euro area average: IMF *International Financial Statistics*, March 2001
 EU-15 average: OECD *Economic Outlook*, December 2000

Table 1. (continued) Maastricht criteria applied to the CEECs

f) Volatility of nominal exchange rates* (%)										
	91	92	93	94	95	96	97	98	99	00
Bulgaria		24.6	5.4	39.7	20.2	77.1	85.6	15.2	0.4	0.1
Czech Rep.				1.4	1.2	1.0	4.4	4.3	2.9	2.5
Hungary	8.0	6.2	4.4	9.6	16.0	10.3	5.8	7.9	4.3	1.8
Poland	6.9	17.3	12.6	14.5	9.5	4.9	5.7	4.7	5.4	3.7
Romania	98.0	77.2	48.5	41.7	19.2	22.1	36.9	14.8	26.7	13.2
Slovakia				3.9	1.6	0.8	1.5	3.9	6.7	2.9
Slovenia			14.4	8.4	2.1	5.6	3.2	2.0	2.4	3.5
Estonia			2.1	0.8	1.6	1.3	1.8	0.4	0.5	0.1
Latvia			17.1	13.8	2.5	1.3	3.4	2.0	3.8	6.4
Lithuania				10.5	6.4	2.5	6.1	3.4	4.4	8.6
CEECs average	37.6	31.3	14.9	14.4	8.0	12.7	15.4	5.9	5.8	4.3
US	5.8	5.8	6.5	3.7	5.9	2.5	6.1	3.4	4.4	8.6

Note: *) Standard deviations in percent to average nominal exchange rates to ECU/Euro over two preceding years

Source: Authors' computations based on the IMF International Financial Statistics, March 2001, monthly averages

Table 2. Exchange rate regimes in the CEECs

	90	91	92	93	94	95	96	97	98	99	00
Bulgaria	3	8	8	8	8	8	8	2	2	2	2
Czech republic	3	3	3	3	3	3	6	7	7	7	7
Estonia	n.a.	n.a.	2	2	2	2	2	2	2	2	2
Hungary	3	3	3	3	3	6	6	6	6	6	6
Latvia	n.a	n.a	8	8	3	3	3	3	3	3	3
Lithuania	n.a	n.a	8	8	2	2	2	2	2	2	2
Poland	3	5	5	5	5	6	6	6	6	6	8
Romania	3	7	7	7	7	7	7	7	7	7	7
Slovakia	3	3	3	3	3	3	6	6	7	7	7
Slovenia	n.a	n.a	7	7	7	7	7	7	7	7	7

Exchange rate regime description:

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 $\pm 1\%$

4: Horizontal Bands, pegs with bands larger than $\pm 1\%$

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 $\pm 1\%$

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.

Source: Halpern, L. and Wyplosz, C. 2001. "Economic Transformation and Real Exchange Rates in the 2000s: The Balassa-Samuelson Connection." Table 2. Exchange Rate Arrangements.

Figure 1

GDP per capita in percent of German GDP per capita
(based on official exchange rates)

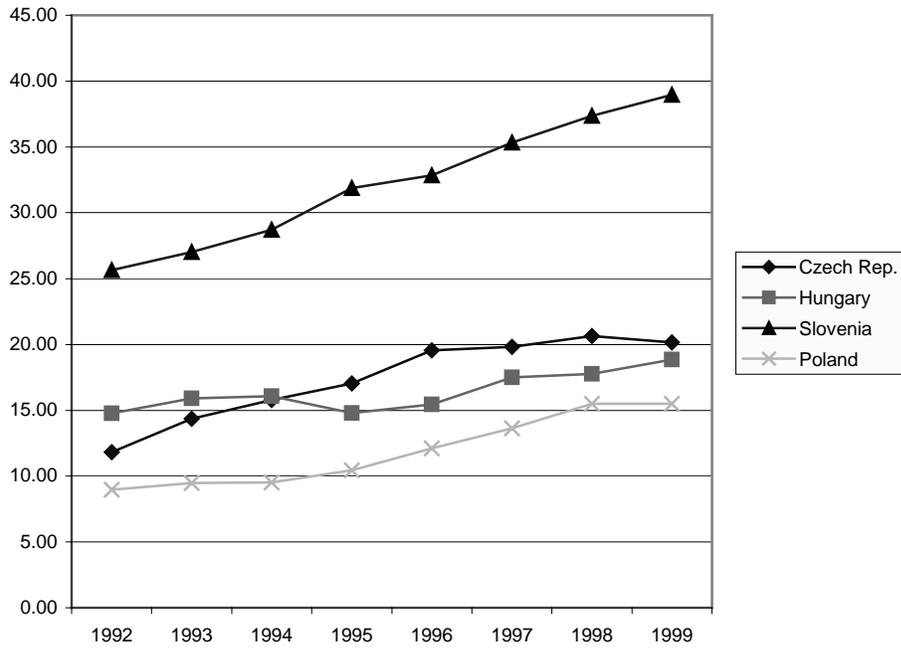


Figure 2

GDP per capita in percent of German GDP per capita
(based on official exchange rates)

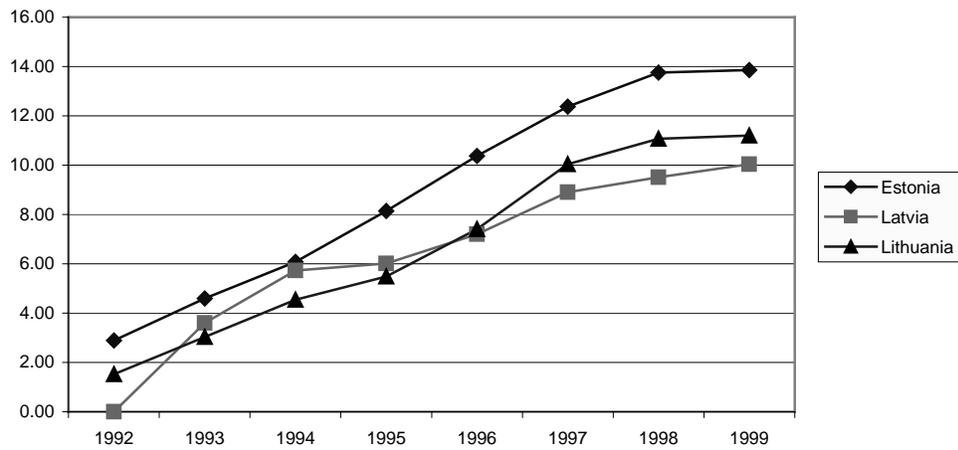


Figure 3

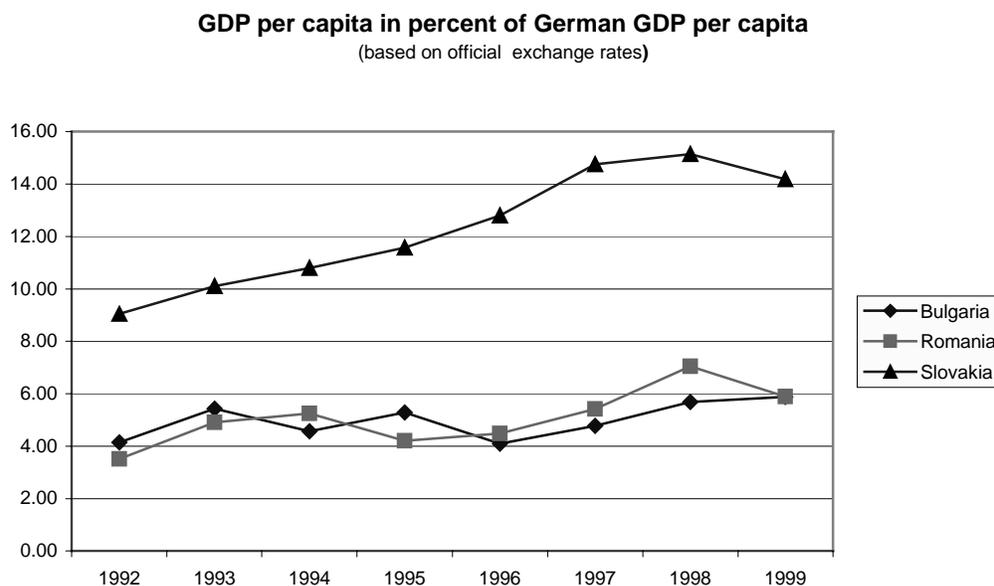


Table 3. Variability of GDP in the CEECs and the EU

Year	Across the CEECs and EU-15	Across the CEECs and EU-15 exl. Bulgaria and Romania
1992	0,36	0,31
1993	0,30	0,27
1994	0,27	0,23
1995	0,25	0,20
1996	0,24	0,18
1997	0,22	0,16
1998	0,20	0,15
1999	0,21	0,15

Note: Variances of log(GDP per capita), USD, official rates

Source: EBRD Transition Report, 2000; authors computations

Table 3. Size and degree of openness of the CEECs

	Share of trade in GDP (%)		GDP per capita (US dollars)		Population (millions)	
	1992	1999	1992	1999	1992	1999
Bulgaria	94	73	1 014	1 513	8,48	8,2
Czech Rep.	63	104	2 892	5 189	10,3	10,3
Hungary	54	94	3 613	4 853	10,3	10,1
Poland	33	44	2 197	3 987	38,4	38,7
Romania	52	53	859	1 517	22,8	22,4
Slovakia	117	109	2 213	3 650	5,3	5,4
Slovenia	100	92	6 280	10 020	2	2
Estonia	94	113	707	3 564	1,5	1,4
Latvia	97*	77	848*	2 582	2,6	2,4
Lithuania	100**	72	374	2 880	3,7	3,7

Notes: *) 1993 figures

***) 1994 figure

Source: EBRD Transition Report, 2000

Table 4. Current accounts
(% of GDP)

	92	93	94	95	96	97	98	99*	00**
Bulgaria	-4.2	-10.1	-0.3	-0.2	0.2	4.2	-0.5	-5.5	-5.5
Czech Rep.		1.3	-1.9	-2.6	-7.4	-6.1	-2.4	-2.0	-3.5
Hungary	0.9	-9.0	-9.4	-5.6	-3.7	-2.1	-4.9	-4.2	-3.4
Poland	1.1	-0.7	0.7	4.5	-1.0	-3.2	-4.4	-7.6	-7.1
Romania	-8.0	-4.5	-1.4	-6.3	-8.9	-6.8	-7.0	-3.8	-4.9
Slovakia		-4.7	4.6	2.1	-10.6	-9.6	-9.7	-5.5	-3.3
Slovenia	7.4	1.5	4.0	-0.5	0.2	0.1	-0.8	-3.9	-2.6
Estonia		1.3	-7.3	-4.4	-9.1	-12.2	-9.2	-5.7	-6.9
Latvia		19.1	5.5	-0.4	-5.4	-6.1	-10.7	-10.3	-9.9
Lithuania		-3.2	-2.2	-10.2	-9.2	-10.2	-12.1	-11.2	-6.0
CEECs average	-0.6	-0.9	-0.8	-2.4	-5.5	-5.2	-6.2	-6.0	-5.3

Notes: *) Estimates

***) Projections

Source: EBRD Transition Report, 2000

Table 5. Chronology of EU Enlargement

Date	Number of participants	Event
1957	6	Germany, France, Italy, Belgium, Luxembourg and the Netherlands sign the Treaty establishing the European Economic Community.
1973	9	Denmark, Ireland and the United Kingdom join the EEC.
1981	10	Greece joins the EEC.
1986	12	Spain and Portugal join the EEC.
1995	15	Austria, Finland and Sweden join the EU.
1998	15+6	EU accession negotiations are started with Cyprus, Hungary, Poland, the Czech Republic, Slovenia and Estonia
2000	15+21	EU accession negotiations are started with Bulgaria, Romania, Slovakia, Latvia, Lithuania, and Malta.

Source: <http://www.mic.org.mt/Malta-EU/chronology.htm>

Annex A

Table A1. Comparison of quarterly and yearly estimates

Period		Supply shocks, yearly							
		Coefficient a				Coefficient b			
		France	Denmark	Portugal	Spain	France	Denmark	Portugal	Spain
1972-2000	Mean	-0.10	-0.02	0.00	0.01	0.43	0.51	0.38	0.32
	St Dev	0.02	0.05	0.02	0.02	0.03	0.05	0.03	0.02
1972-1979	Mean	-0.12	0.05	-0.02	0.02	0.47	0.58	0.42	0.35
	St Dev	0.01	0.04	0.02	0.03	0.47	0.58	0.42	0.35
1980-1990	Mean	-0.10	-0.02	0.01	0.01	0.42	0.50	0.36	0.31
	St Dev	0.01	0.02	0.03	0.01	0.02	0.05	0.03	0.03
1991-2000	Mean	-0.09	-0.07	0.00	0.01	0.41	0.47	0.36	0.30
	St Dev	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.14

Period		Supply shocks, quarterly							
		Coefficient a				Coefficient b			
		France	Denmark	Portugal	Spain	France	Denmark	Portugal	Spain
1972:1-2000:4	Mean	-0.03	0.01	0.00	0.01	0.46	0.49	0.40	0.46
	St Dev	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.02
1972:1-1979:4	Mean	-0.02	0.08	0.01	0.01	0.47	0.50	0.40	0.49
	St Dev	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.02
1980:1-1990:4	Mean	-0.03	0.01	0.01	0.01	0.45	0.48	0.39	0.45
	St Dev	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
1991:1-2000:4	Mean	-0.03	-0.05	-0.01	0.00	0.47	0.49	0.41	0.46
	St Dev	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

Period		Demand shocks, yearly							
		Coefficient a				Coefficient b			
		France	Denmark	Portugal	Spain	France	Denmark	Portugal	Spain
1972-2000	Mean	0.01	0.11	-0.03	-0.01	0.22	0.66	0.54	0.67
	St Dev	0.02	0.04	0.02	0.02	0.21	0.01	0.02	0.04
1972-1979	Mean	0.00	0.13	-0.04	-0.03	0.22	0.66	0.57	0.72
	St Dev	0.01	0.03	0.02	0.02	0.22	0.66	0.57	0.72
1980-1990	Mean	0.02	0.14	-0.05	0.00	0.13	0.67	0.54	0.65
	St Dev	0.02	0.04	0.01	0.02	0.20	0.01	0.02	0.02
1991-2000	Mean	0.01	0.07	-0.01	-0.01	0.33	0.67	0.53	0.65
	St Dev	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00

Period		Demand shocks, quarterly							
		Coefficient a				Coefficient b			
		France	Denmark	Portugal	Spain	France	Denmark	Portugal	Spain
1972:1-2000:4	Mean	-0.01	0.01	-0.01	0.00	0.50	0.44	0.48	0.62
	St Dev	0.02	0.01	0.01	0.01	0.02	0.03	0.02	0.02
1972:1-1979:4	Mean	-0.03	0.00	-0.02	0.00	0.52	0.48	0.51	0.64
	St Dev	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
1980:1-1990:4	Mean	0.00	0.02	-0.01	0.00	0.48	0.42	0.47	0.61
	St Dev	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
1991:1-2000:4	Mean	0.01	0.02	-0.01	0.00	0.49	0.42	0.47	0.61
	St Dev	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Figure A1. Comparison of quarterly and yearly estimates : convergence of France, Denmark, Portugal, and Spain to Germany as opposed to the United States

(a) Supply Shocks, coefficients b(t)

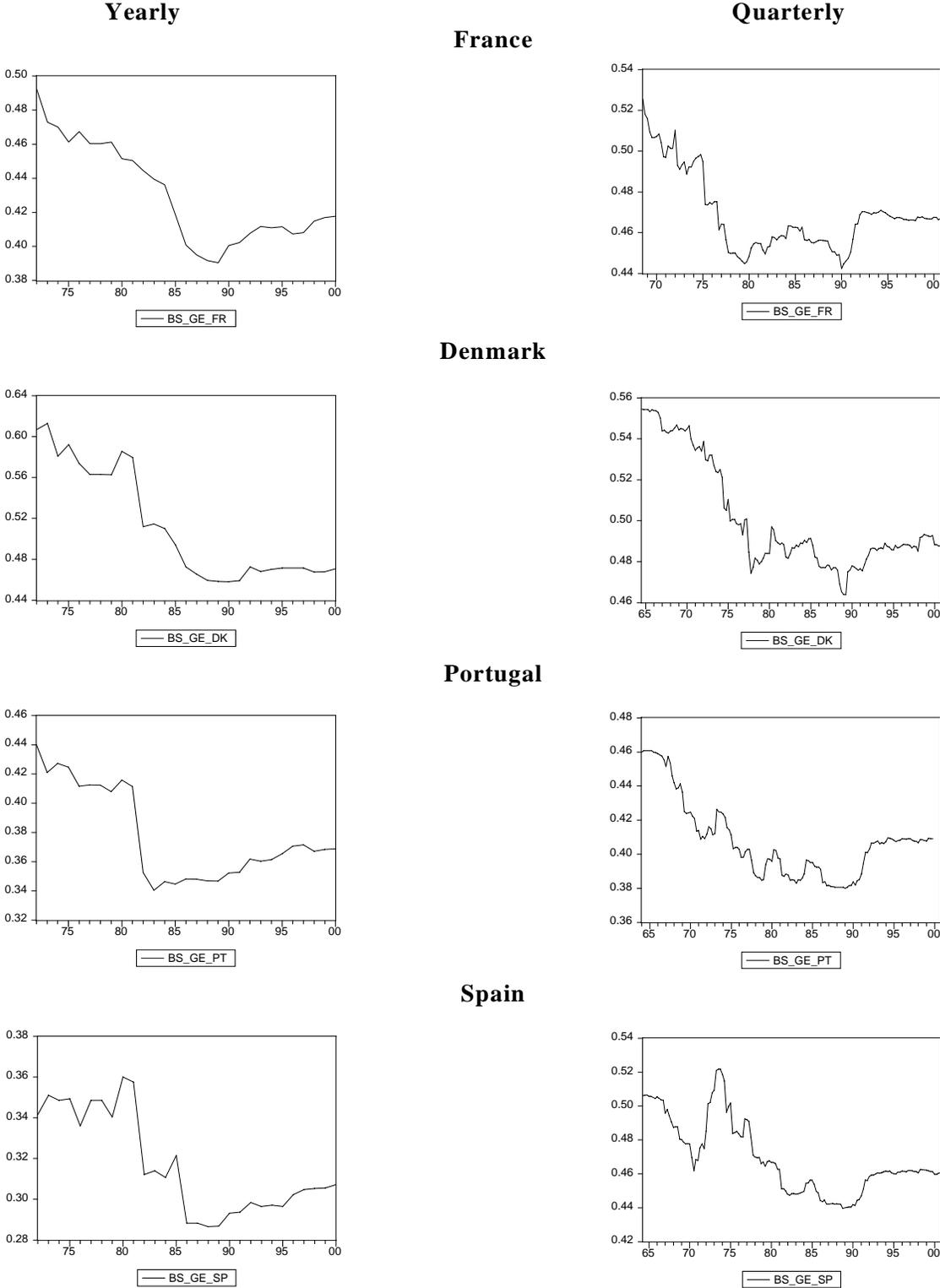


Figure A1. (continued) Comparison of quarterly and yearly estimates : convergence of France, Denmark, Portugal, and Spain to Germany as opposed to the United States

(b) Demand Shocks, coefficients $b(t)$

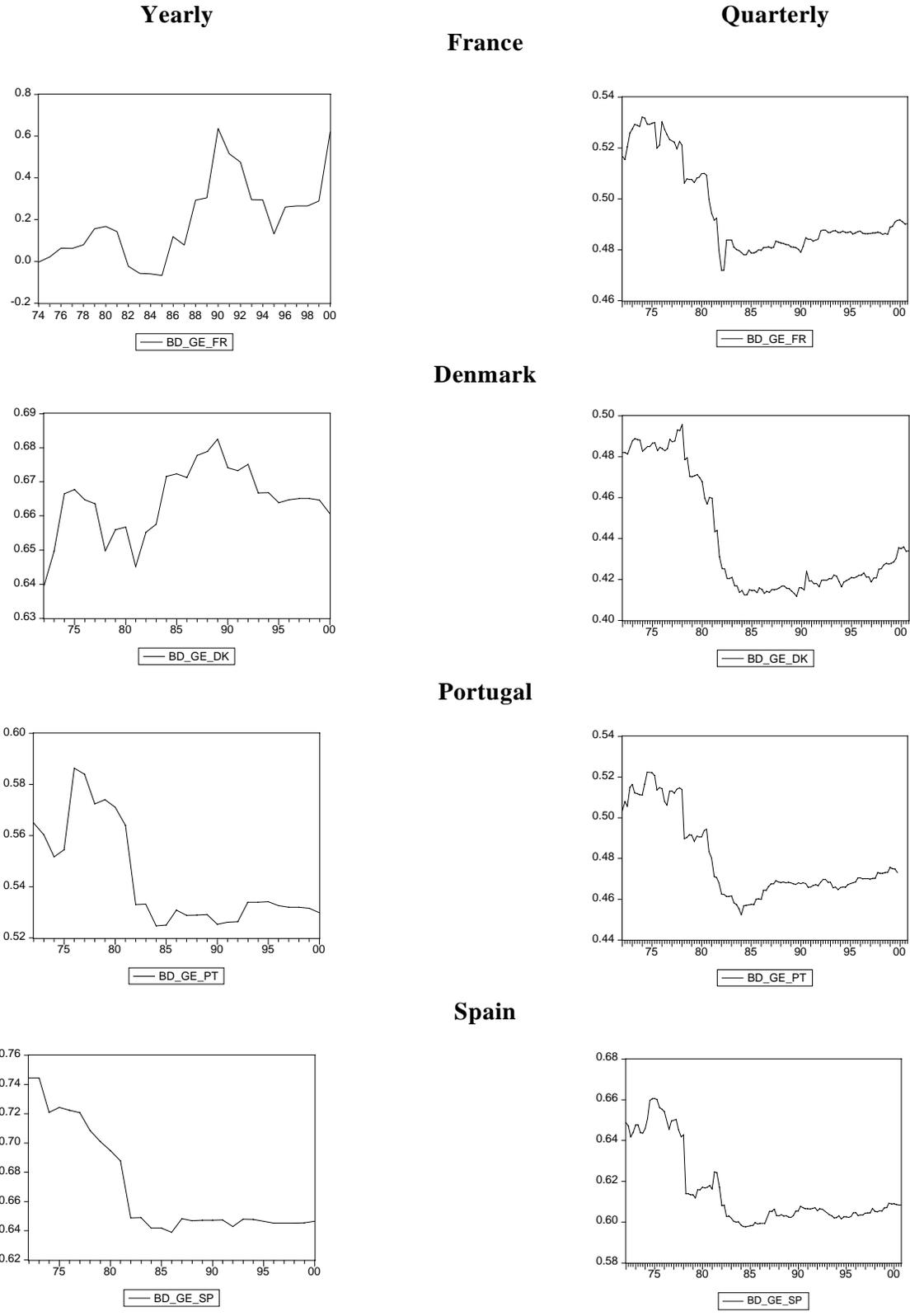


Table B1. Supply and Demand shocks convergence of Portugal and Spain towards EU

Coefficient a(t)		75:1-84:4	90:1-00:4	73:1-00:4
Portugal S-shocks	mean	0,00	-0,01	-0,01
	std.dev.	0,05	0,01	0,06
Spain S-shocks	mean	0,11	0,00	0,05
	std.dev.	0,07	0,01	0,07
Portugal D-shocks	mean	0,02	0,02	0,02
	std.dev.	0,01	0,01	0,01
Spain D-shocks	mean	-0,01	-0,02	-0,02
	std.dev.	0,01	0,00	0,01
Coefficient b(t)				
Portugal S-shocks	mean	0,65	0,61	0,65
	std.dev.	0,04	0,01	0,06
Spain S-shocks	mean	0,09	0,27	0,20
	std.dev.	0,05	0,01	0,09
Portugal D-shocks	mean	0,35	0,60	0,54
	std.dev.	0,52	0,14	0,38
Spain D-shocks	mean	0,57	0,57	0,57
	std.dev.	0,01	0,00	0,01

All residuals pass the test for normality, except Portuguese shocks when equation is estimated over the whole period.

Table B2. Supply and Demand shocks convergence of Portugal and Spain to Germany

Coefficient a(t)		75:1-84:4	90:1-00:4	73:1-00:4
Portugal S-shocks	mean	0,01	-0,01	0,00
	std.dev.	0,01	0,01	0,01
Spain S-shocks	mean	0,02	0,00	0,01
	std.dev.	0,01	0,01	0,01
Portugal D-shocks	mean	-0,01	-0,01	-0,01
	std.dev.	0,01	0,01	0,01
Spain D-shocks	mean	0,01	0,00	0,00
	std.dev.	0,01	0,00	0,01
Coefficient b(t)				
Portugal S-shocks	mean	0,39	0,40	0,40
	std.dev.	0,01	0,01	0,01
Spain S-shocks	mean	0,47	0,46	0,46
	std.dev.	0,02	0,01	0,02
Portugal D-shocks	mean	0,49	0,47	0,48
	std.dev.	0,02	0,00	0,02
Spain D-shocks	mean	0,62	0,61	0,61
	std.dev.	0,02	0,00	0,02

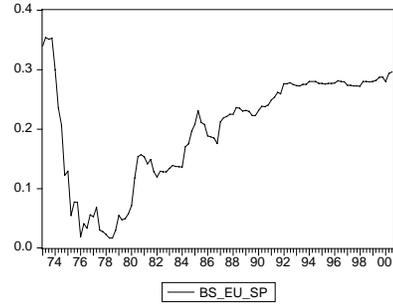
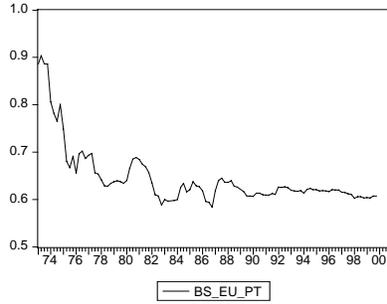
Figure B1. Supply and Demand shocks convergence of Portugal and Spain towards EU

a) Supply

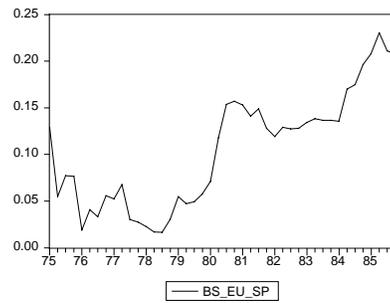
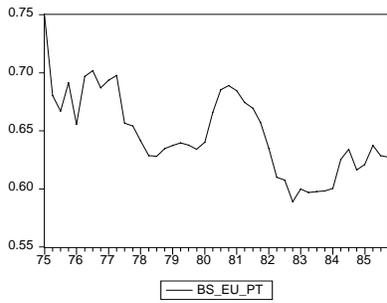
Portugal

Spain

1973-2000



1975-1985



1990-2000

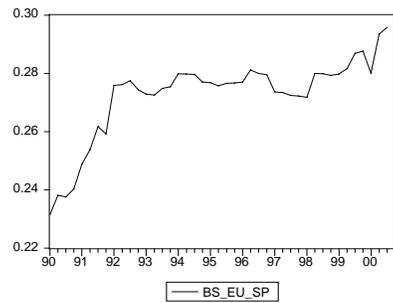
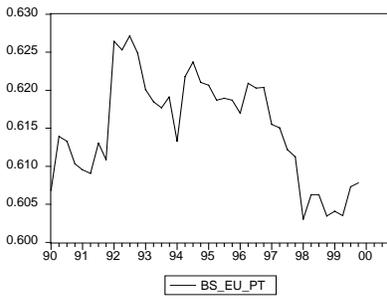


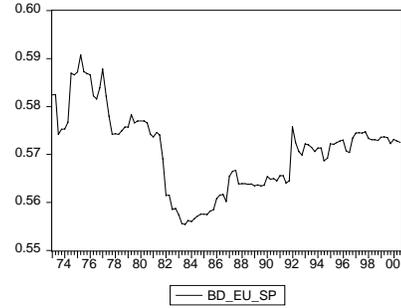
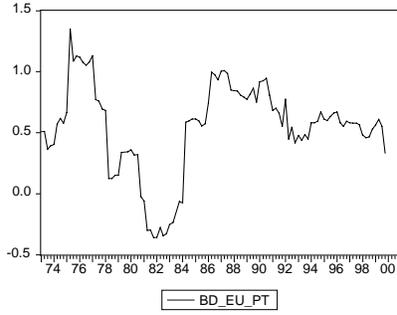
Figure B1. (continued) Supply and Demand shocks convergence of Portugal and Spain towards EU

b) Demand

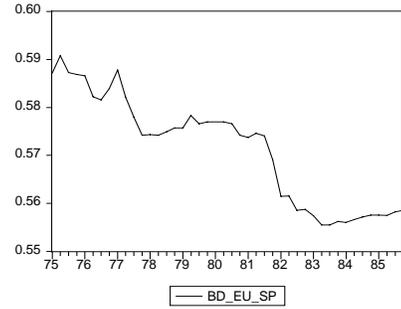
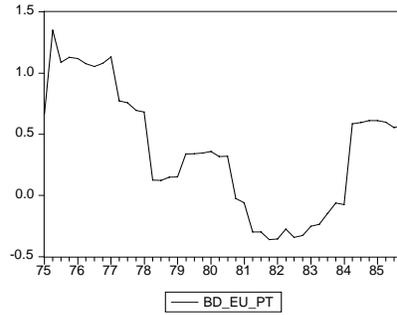
Portugal

Spain

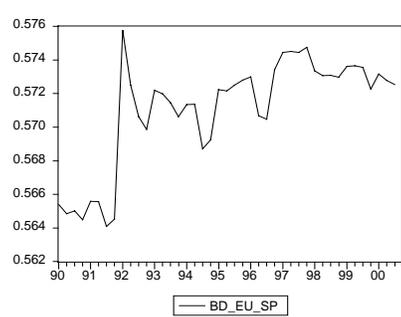
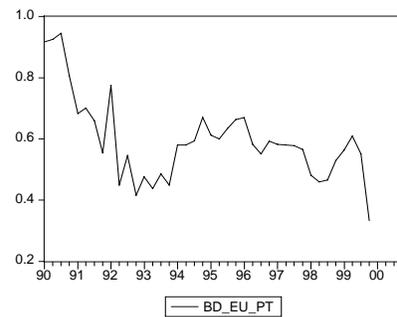
1973-2000



1975-1985



1990-2000



Annex C**Table C1. Convergence of the CEECs towards the European Union****Supply shocks**

	Czech Rep	Estonia	Hungary	Latvia	Poland	Romania	Slovakia	Slovenia
	Coefficients a(t)							
Mean	0,07	-0,08	0,02	-0,05	-0,02	0,04	0,25	0,08
St Dev	0,08	0,10	0,06	0,08	0,03	0,09	0,15	0,12
	Coefficients b(t)							
Mean	0,47 ¹⁾	0,63 ¹⁾	0,68	0,67	0,37 ¹⁾	0,28 ¹⁾	0,43 ¹⁾	0,28 ¹⁾
St Dev	0,09	0,15	0,08	0,09	0,05	0,15	0,50	0,31

Demand shocks

	Czech Rep	Estonia	Hungary	Latvia	Poland	Romania	Slovakia	Slovenia
	Coefficients a(t)							
Mean	0,12	0,06	0,04	0,06	0,02	0,16	0,14	0,06
St Dev	0,07	0,09	0,08	0,43	0,10	0,10	0,11	0,07
	Coefficients b(t)							
Mean	0,41 ²⁾	0,38 ²⁾	0,36 ²⁾	0,40 ²⁾	0,61	0,19 ³⁾	0,20 ³⁾	0,35 ³⁾
St Dev	0,09	0,04	0,06	0,15	0,28	0,07	0,05	0,16

Notes. The superscripts denote a comparison with the corresponding values of Portugal and Spain prior to their EU entry (estimated over 1975-1985):

¹⁾: inferior to Portuguese supply shocks (0.65)

²⁾: inferior to Spanish demand shocks (0.57)

³⁾: not exceeding Portuguese demand shocks (0.35)

Table C3. Convergence of the CEECs towards Germany

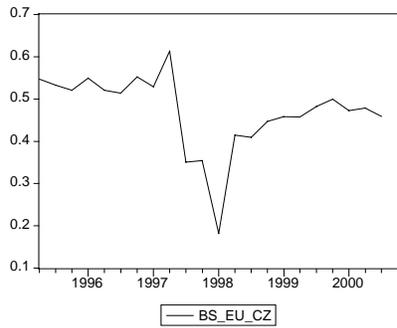
	Czech Rep	Estonia	Hungary	Latvia	Poland	Romania	Slovakia	Slovenia
	Coefficients a(t)							
Mean	-0,01	-0,13	-0,01	-0,07	-0,19	-0,08	-0,15	-0,10
St Dev	0,09	0,12	0,06	0,08	0,10	0,07	0,08	0,09
	Coefficients b(t)							
Mean	0,66	0,85	0,75	0,76	0,43	0,48	0,54	0,59
St Dev	0,11	0,12	0,13	0,12	0,70	0,07	0,58	0,08

	Czech Rep	Estonia	Hungary	Latvia	Poland	Romania	Slovakia	Slovenia
	Coefficients a(t)							
Mean	-0,01	-0,10	-0,01	0,10	0,00	-0,03	-0,08	-0,06
St Dev	0,09	0,10	0,09	0,15	0,06	0,10	0,10	0,07
	Coefficients b(t)							
Mean	0,67	0,48	0,59	0,54	0,36	0,61	0,52	0,41
St Dev	0,08	0,07	0,07	0,07	0,08	0,09	0,06	0,03

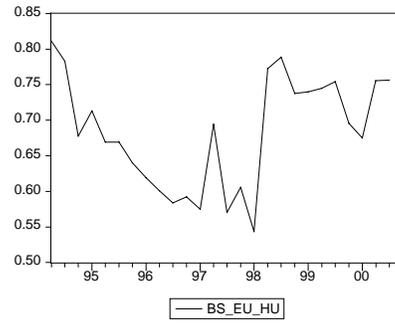
Figure C1. Convergence of the CEECs towards the European Union

a) Supply shocks, coefficients $b(t)$

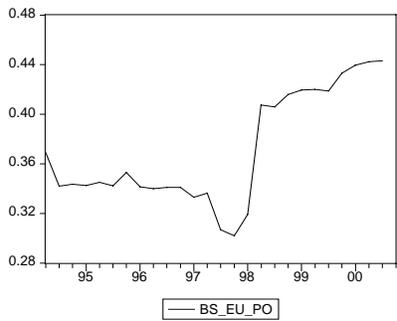
Czech Republic



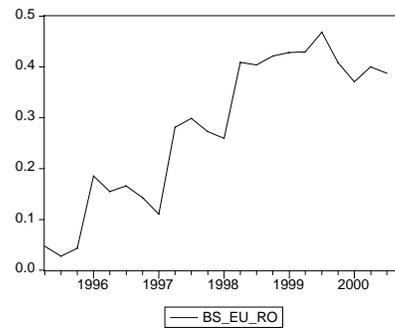
Hungary



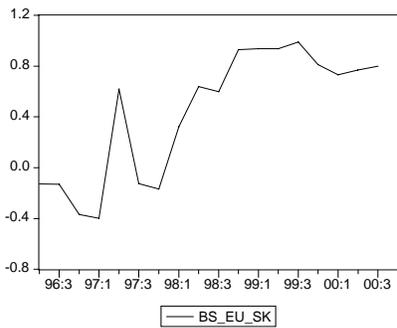
Poland



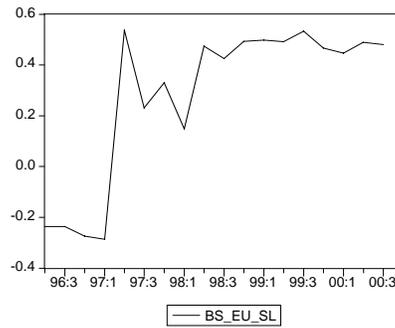
Romania



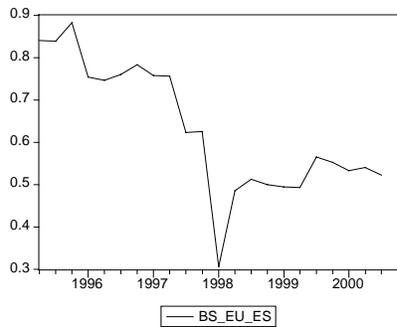
Slovakia



Slovenia



Estonia



Latvia

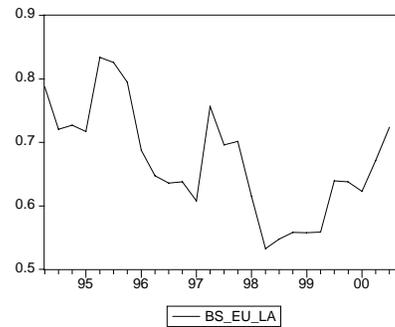
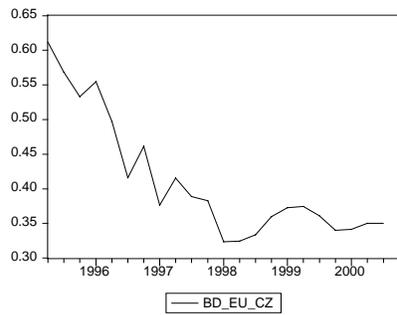


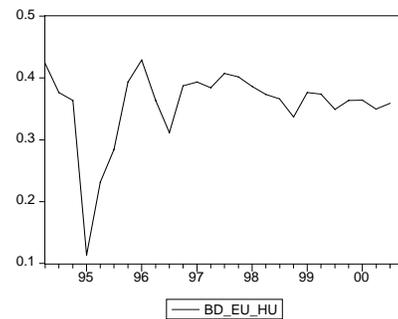
Figure C1. (continued) Convergence of the CEECs towards the European Union

b) Demand shocks, coefficients $b(t)$

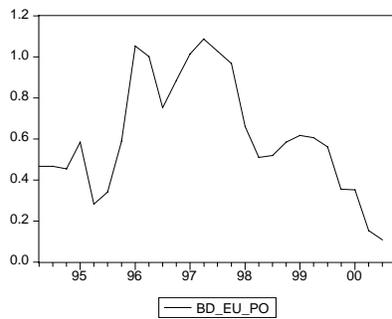
Czech Republic



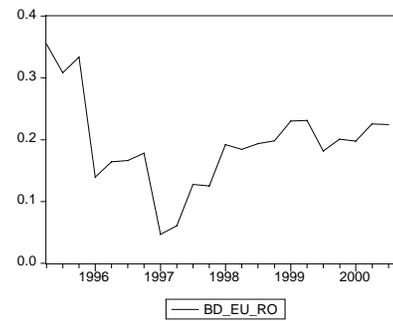
Hungary



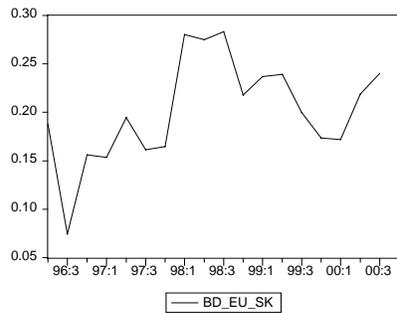
Poland



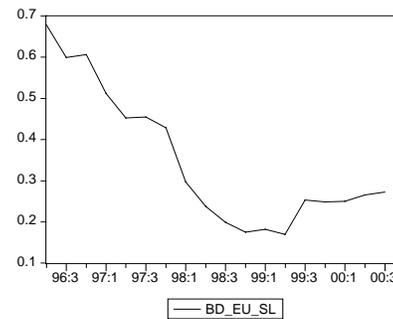
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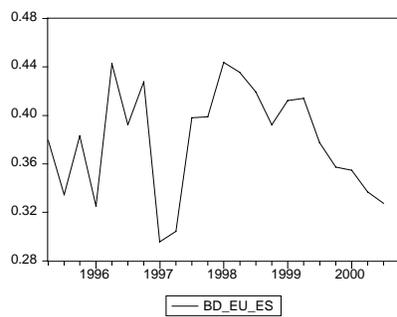
Slovakia



Slovenia



Estonia



Latvia

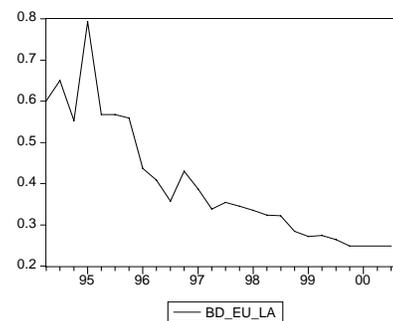
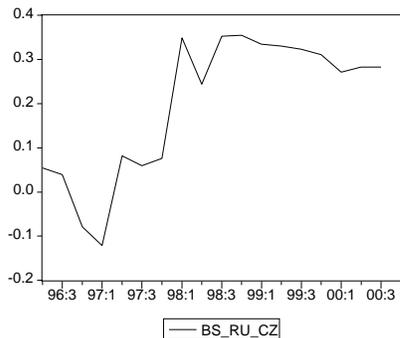


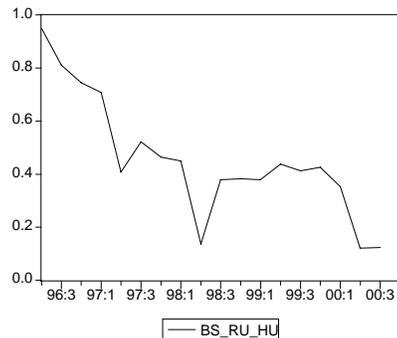
Figure C2. Convergence of the CEECs towards Russia

a) Supply shocks, coefficients b(t)

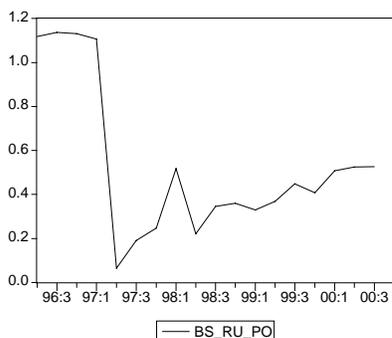
Czech republic



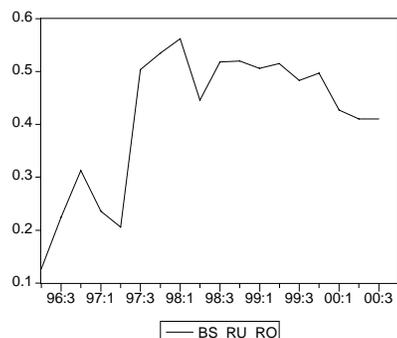
Hungary



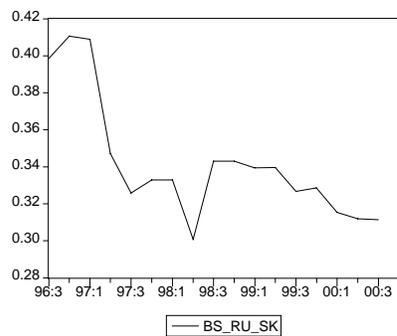
Poland



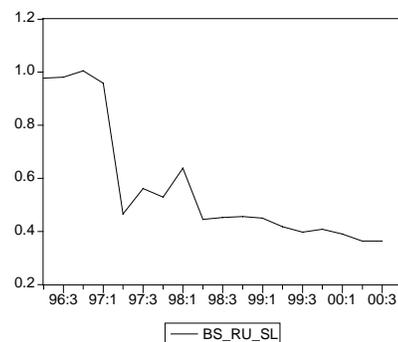
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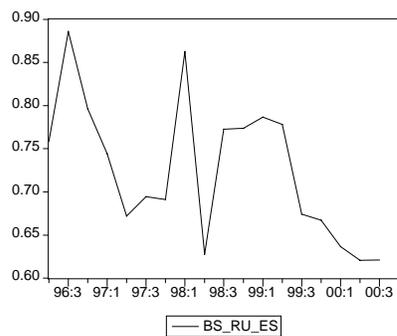
Slovakia



Slovenia



Estonia



Latvia

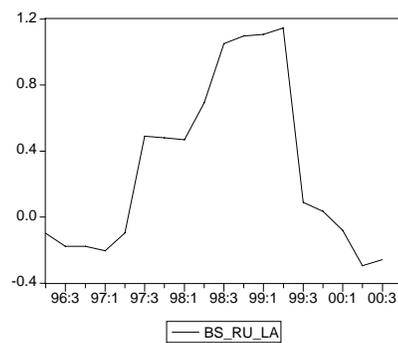
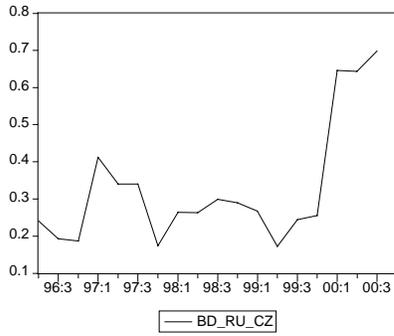


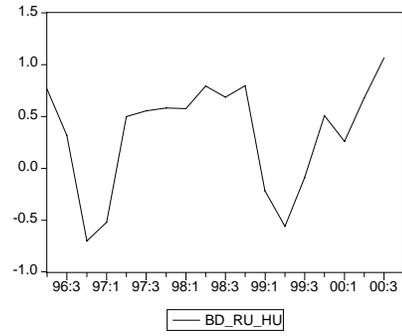
Figure C2. (continued) Convergence of the CEECs towards Russia

b) Demand shocks, coefficients b(t)

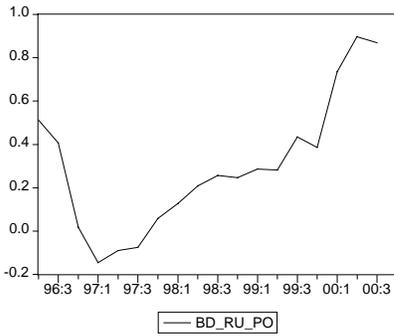
Czech republic



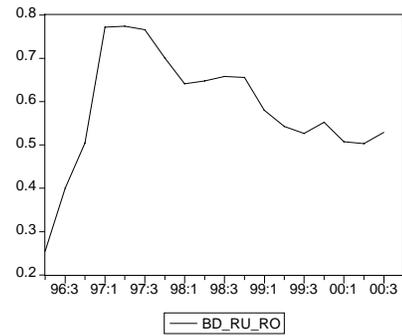
Hungary



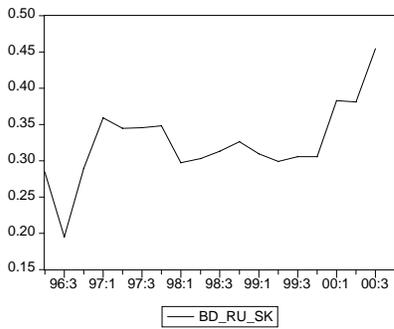
Poland



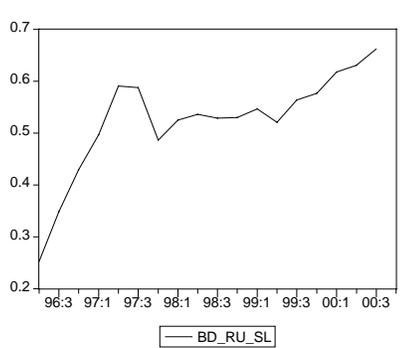
Romania



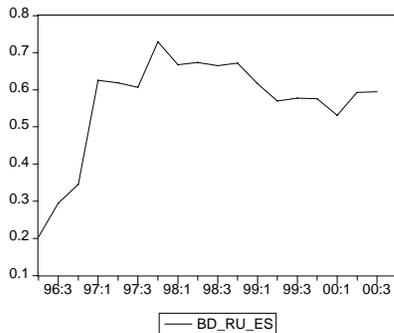
Slovakia



Slovenia



Estonia



Latvia

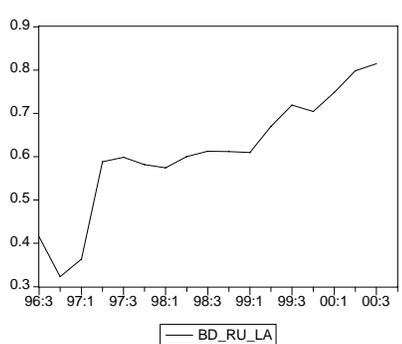
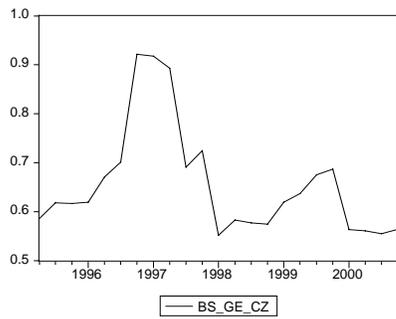


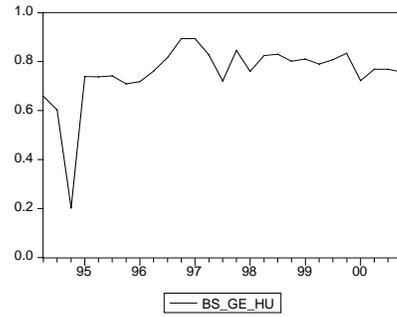
Figure C3. Convergence of the CEECs towards Germany

(a) Supply shocks, coefficients b(t)

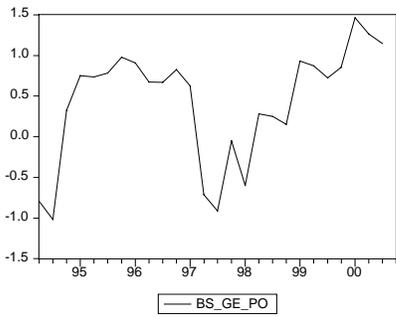
Czech republic



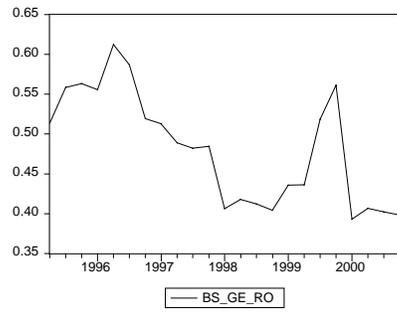
Hungary



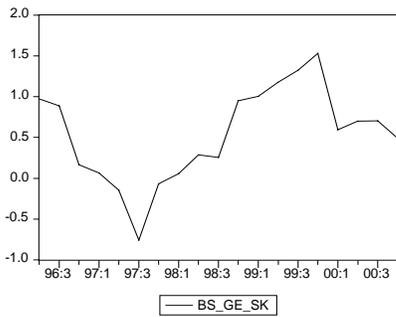
Poland



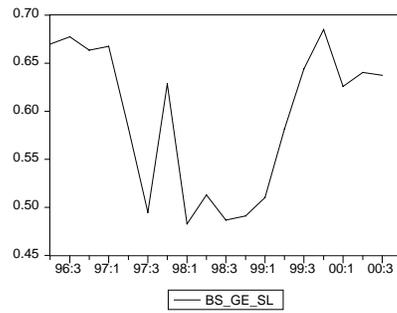
Romania



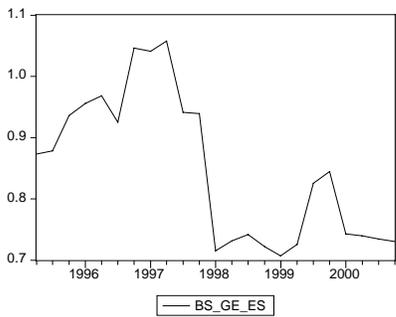
Slovakia



Slovenia



Estonia



Latvia

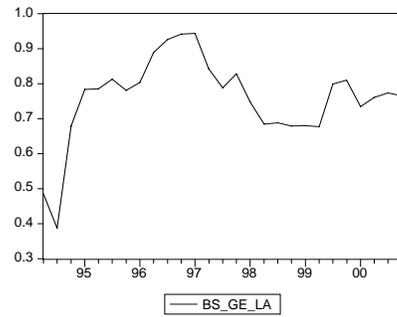
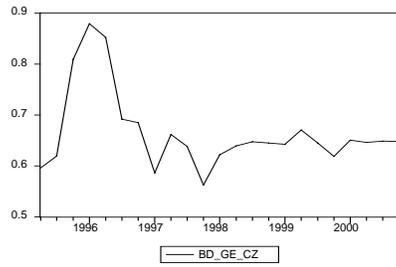


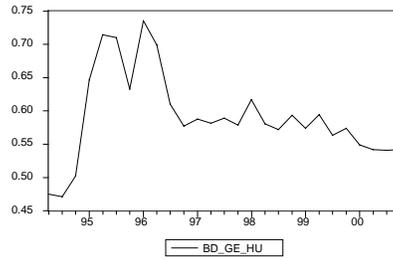
Figure C3. (continued) Convergence of the CEECs towards Germany

(b) Demand shocks, coefficients $b(t)$

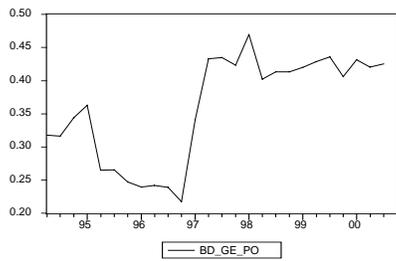
Czech republic



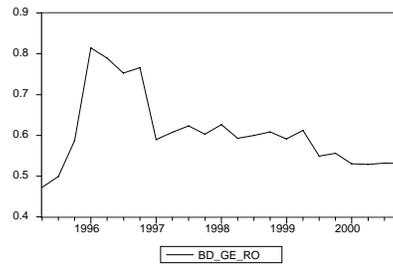
Hungary



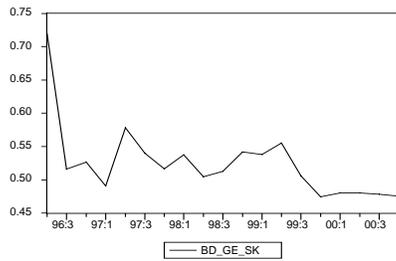
Poland



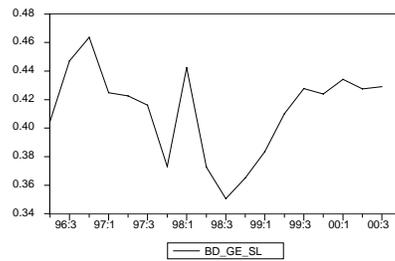
Romania



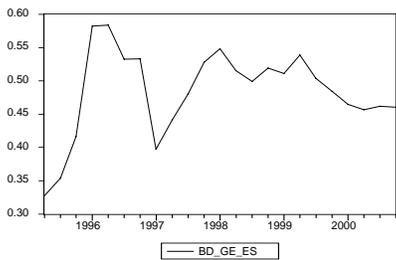
Slovakia



Slovenia



Estonia



Latvia

