

FDI, Trade and Growth in CESEE Countries

Jarko Fidrmuc,
Reiner Martin¹

Central, Eastern and Southeastern Europe (CESEE) had experienced an export boom as well as a surge in capital inflows up to the outbreak of the economic and financial crisis, which had a major negative impact on these two facets of the CESEE growth model. Did the long-term growth prospects of the CESEE countries deteriorate, too? To answer this question, we estimate the long-run relationship and test the causality between capital flows, exports and industrial production. Vector error correction models show that exports and the stock of FDI in the CESEE region are positively related to industrial production and thus economic growth. By contrast, portfolio investment is only weakly related to the region's industrial growth performance. These findings imply that the CESEE countries should pursue two objectives: remain attractive locations for inward FDI and enhance their export prospects.

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1 Introduction and Motivation

Most of the countries in Central, Eastern and Southeastern Europe (CESEE)² are seen as good examples of the growth-enhancing effect of downhill capital flows, i.e. capital flows from relatively capital-rich to relatively capital-poor countries. In addition, they are good examples for an export-led growth strategy. Especially in more recent papers on growth in the region, it is, however, often emphasized that in the years before the recent economic and financial crisis, growth had been overly consumption driven (EBRD, 2010). These two facets of the CESEE region's recent growth experience – substantial capital inflows and a very strong export performance – are closely interrelated. Besides, they need to be seen in the context of the region's gradual EU integration, which, in 2004 and 2007, culminated in the accession of ten CESEE countries to the EU. First, a large share of the capital flows into the region originated from the EU. These inflows, in particular inward FDI, arguably helped build up the capital stock in the CESEE countries, which was expected to facilitate export growth. Second, EU integration provided a major boost for the CESEE exporting industries by opening up a large market at the region's doorstep.

The economic and financial crisis, which started in 2007 (or 2008 for most of the CESEE region), had a major impact on these two facets of the CESEE growth model.³ First, capital inflows into the region took a severe hit, yet the worst-case scenario of a financial meltdown did not occur. Second, import demand in Western European countries, the region's main trading partners, decreased significantly, with a marked effect on the trade of the CESEE countries (Francois and Wörz, 2009; Keppel and Wörz, 2010). Taken together, these developments have led to a

¹ Oesterreichische Nationalbank, Foreign Research Division, jarko.fidrmuc@oenb.at; European Central Bank, EU Countries Division, reiner.martin@ecb.int. The views expressed in this paper are exclusively those of the authors and do not necessarily reflect those of the Oesterreichische Nationalbank, the European Central Bank or the Eurosystem. We benefited from comments by Doris Ritzberger-Grünwald, Peter Mooslechner, Markus Eller, Julia Wörz, Peter Backé, Marie Raková, Gergely Kiss and participants of the OeNB's Conference on European Economic Integration and an ECB research seminar, as well as two anonymous referees. We acknowledge language advice by Ingrid Haussteiner and Irene Popenberger. Furthermore, we would like to thank Magdalena Komzáková and Andreas Nader for excellent research assistance.

² We focus on the following countries: Bulgaria, the Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

³ For more details on the impact of the crisis on the region, see e.g. Gardó and Martin (2010).

rise in uncertainty about the region's medium- and long-term growth prospects. In particular, a possible permanent decline of capital flows (Jevčák, Setzer and Suardi, 2010) is seen as a potential cause of concern for the long-term growth prospects of the region. In addition, there is considerable uncertainty about the long-term prospects of external demand.

In this paper, we address the medium-term growth prospects for the CESEE region by estimating the long-run relationship between FDI, exports and growth. More specifically, in the framework of vector error correction models, we test whether growth is determined by the external variables. In particular, we present the pair-wise weak exogeneity tests between growth and FDI or exports, which are associated with the investment-led growth hypothesis and the export-led growth hypothesis. Trade and FDI are often mentioned in the literature as the most important elements of the CESEE growth model. However, to the best of our knowledge, they have not been tested formally to date. Therefore, we believe that a rigorous quantitative cross-country examination of the interlinkages between capital flows, exports and industrial production can help assess the possible long-term implications of the economic and financial crisis for the countries in the region.⁴

The paper is organized as follows. In section 2, we review the relevant literature. Section 3 provides stylized facts on the key variables of our analysis, and section 4 describes the estimation strategy as well as the empirical results. In section 5, we present our conclusions and propose some policy recommendations.

2 Literature Overview

2.1 Foreign Activities and Economic Growth

There is a long tradition of economic theories relating exports and other foreign activities to economic growth. Basically, these arguments go back to mercantilism and classical trade theories as presented by Adam Smith and David Ricardo. The importance of economic openness for growth gained popularity again when a number of Southeastern Asian emerging market economies (EMEs), e.g. Hong Kong, South Korea, Taiwan and Singapore, posted very rapid growth, especially between 1960 and 1980.⁵ This was generally seen as a result of these countries opening up their economies, reducing trade barriers and attracting FDI. More generally, these explanations for rapid growth in a number of very open economies resulted in the development of the export-led growth hypothesis (Balassa, 1978; Marin, 1992). This theory, in turn, was also one of the intellectual arguments in favor of a rapid economic opening up of the CESEE countries after the end of the cold war and their integration into the EU.⁶ Similarly, Herzer, Klasen and Nowak-Lehmann (2008) discuss FDI and growth in developing countries. For Eastern European countries, the relationship between FDI and growth is often addressed in earlier literature. Damijan and Rojec (2007) show that FDI contributed to the

⁴ Besides addressing this important policy question, the paper also extends the existing literature in this field as more recent empirical approaches, such as cointegration analysis and weak exogeneity tests, are used.

⁵ For a critical discussion with a focus on South Korea and Taiwan, see Rodrik (1995).

⁶ More recently, the dynamic growth in China and India is often also seen from this perspective (Herrerias and Orts, 2010).

catching-up in CESEE countries. Campos and Kinoshita (2002) show that FDI was an important channel of technology transfer. Correspondingly, FDI had a significant and positive impact on growth in CESEE countries. Badinger and Tondl (2002) stress also the importance of capital accumulation and technology transfer for catching-up in Eastern Europe.

Nevertheless, the theoretical explanation of the export-led growth hypothesis remained rather weak. Several authors proposed models including learning-by-exporting effects (Krugman, 1980; Grossman and Helpman, 1991; Bernard et al., 2003; Damijan and Kostevc, 2006), but the empirical evidence supporting these models remained weak.⁷ More recently, foreign trade theory based on heterogeneous firms (Melitz, 2003; Helpman, Melitz and Yeaple, 2004) stressed the relationship between productivity and different modes of international activities. In this strand of the literature, the productivity of firms at the domestic level is regarded as a major determinant of activities abroad. Once a firm achieves a certain productivity threshold, it starts to export to foreign markets. The most productive firms also set up subsidiaries abroad, which inherit the high productivity from their parent companies. This link (“pecking order”) between activities abroad and the relative level of productivity is due to the relationship between transport costs or the fixed costs of market entry and the variable costs of serving foreign markets from the home location. Only firms with a sufficiently high productivity level can export and compete with local firms. The productivity differential must be so high that products are competitive although they are subject to transport costs. Furthermore, only the most productive firms can afford to invest abroad, which is the microeconomic explanation why such inward investment flows increase the aggregate productivity level in the receiving country. In the new trade literature, this “self-selection channel” (Wagner, 2002) between foreign activity and productivity is referred to as the extensive margin of trade and FDI. At the macroeconomic level, the access of the most productive firms to foreign markets causes a link between foreign activity and growth, which is at the core of both the export- and the investment-led growth hypothesis.

2.2 Capital Inflows and Growth

The second facet of the CESEE growth model that we address in this paper – the substantial capital inflows in recent years – triggered a large amount of research that focused on its determinants and economic implications. Starting with the determinants for downhill capital flows, Lane (2008) emphasizes that EU accession implied lifting all capital controls at the time of accession at the latest and resulted in a range of institutional provisions that arguably fostered capital inflows. In addition, the region’s increasing financial integration with the EU, in particular the widespread foreign ownership of the CESEE banking sector, also contributed to capital inflows (Herrmann and Winkler, 2008).⁸

⁷ While some authors found that exports had a positive impact on firms’ productivity (Baldwin and Gu, 2003; Blalock and Gertler, 2004), others found no such impact (Bernard and Jensen, 1999; Arnold and Hussinger, 2005).

⁸ On the determinants of capital flows, see also e.g. Gibson and Tsakalotos (2004).

Turning to the economic implications of capital inflows into the region, Mileva (2008) finds that during the period from 1995 to 2005, FDI into 22 transition countries added to the capital stock and stimulated additional investment in the host countries, at least in less advanced transition economies. By contrast, loans (often from parent banks to local subsidiaries) are found to have only a significant positive effect on other investment in advanced transition economies, notably the new EU Member States and candidate countries. Mileva finds no significant effect for portfolio capital inflows. In another cross-country study, Gheeraert and Malek Mansour (2005) use a structural econometric model based on earlier work by Islam (1995) and find a significantly positive relationship between private capital flows and economic growth in 45 EMEs, including five CESEE countries as well as Russia. The results for FDI are, however, considerably more significant than for portfolio and equity investment.

Generally speaking, the academic debate on capital inflows into CESEE tended to be less skeptical of possible negative effects than it was for other emerging market regions (von Hagen and Siedschlag, 2008). This was partly because a relatively large share of capital inflows was FDI, which is seen as less volatile and more beneficial for economic development than short-term capital flows (Abiad, Leigh and Mody, 2009). Lane and Milesi-Ferretti (2006) argue, for example, that the large capital inflows to the CESEE countries had a positive impact on convergence and stress that FDI provided “attractive risk-sharing and technological benefits.” Other authors emphasize that the sustainability of the rapid convergence process in these countries also depends on the use of capital inflows. For instance, Bems and Schellekens (2007) argue that the recent rapid financial deepening process in emerging Europe disproportionately benefited the nontradable sector including real estate and construction rather than exports.⁹ Following the same line of reasoning, Atoyán (2010) maintains that future growth in the CESEE countries should be supported more by exports rather than domestic demand and more by domestic savings rather than foreign capital. Another hotly debated issue related to recent capital inflows into the region is whether credit growth is still an equilibrium phenomenon. Zumer, Égert and Backé (2009) argue that the ratio of private sector credit stocks to GDP reached, and in a few cases surpassed, its estimated equilibrium level by early 2009 in most countries of the region.

Looking at EMEs outside the CESEE region, Sethi and Patnaik (2007) find long-run equilibrium relationships between private capital inflows into India, economic growth and the exchange rate for the period from 1995 to 2006. More specifically, they find that FDI and, to a smaller extent, portfolio investment have a positive impact on economic growth, while foreign institutional investment (FII) has a negative effect.¹⁰ The BIS Committee on the Global Financial System (BIS, 2009) finds cross-country evidence that equity flows, especially FDI, are beneficial for growth because they diversify risk abroad and are often linked with a transfer of valuable expertise. By contrast, the benefits from debt flows are found to be ambiguous. In fact, this BIS report suggests that the opening up of capital

⁹ Supporting this argument, Brixiova, Vartia and Wörgötter (2010) found that the massive recent capital inflows into Estonia had led to an excessive allocation of resources in the nontradable sector.

¹⁰ Kim and Yong Yang (2008) find that inflows into South Korea led to a rise in stock prices but not in land prices.

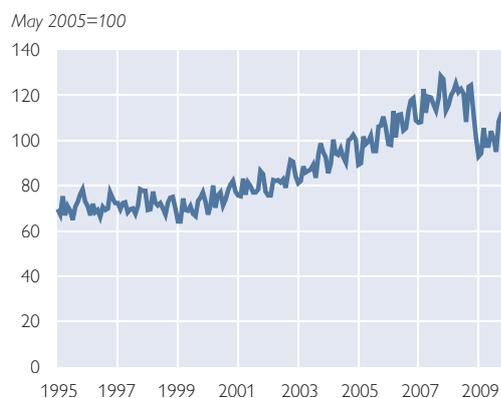
accounts only exerts a positive impact on the level of real income via the broadening and deepening of domestic financial markets, the strengthening of local financial institutions and the improvement of macroeconomic policies. The liberalization of capital flows is actually found to entail economic dangers if these elements are absent. Sabarowski (2009) looks at the appreciation of the real exchange rate due to capital inflows and the resulting possible destabilization of the macroeconomic situation. In line with the BIS report, he argues that this effect can be partly mitigated by developing a deep financial sector. Moreover, he finds that flexible exchange rate regimes help reduce the negative impact of capital inflows on the real exchange rate.

The long-term implications of the crisis for the growth prospects of the region have been discussed widely since the global economic and financial crisis started to affect the CESEE region, *inter alia* via a considerable decrease in capital imports and a collapse in export demand. Furceri and Zdzienicka (2010), looking at 11 European transition economies, find a stronger negative long-term effect on output in smaller transition countries with a relatively higher dependence on

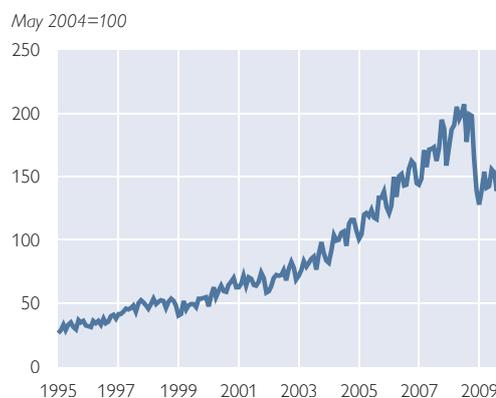
Chart 1

Stylized Facts on Industrial Production, Exports and Capital Stocks in CESEE Countries, 1995–2009

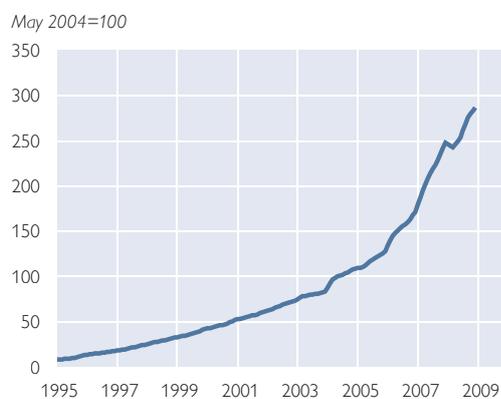
Industrial Production



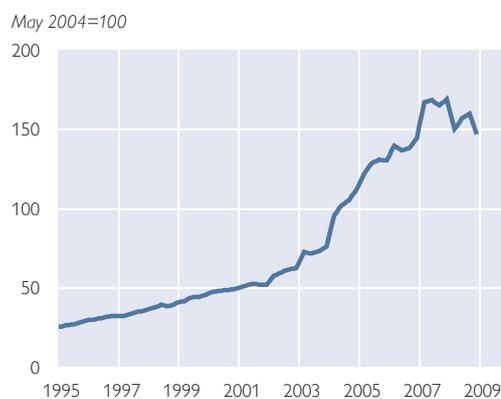
Exports



FDI Stocks



Portfolio Investment Stocks



Source: IMF, ECB, OeNB.

Note: Unweighted average of 11 CESEE countries (Bulgaria, the Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia).

external financing. They also find that this negative effect is much stronger in transition countries than in more advanced EU economies.¹¹

To what extent external financing will resume remains to be seen, however. In the fall of 2009, the IMF (2009) assumed that FDI inflows to emerging Europe would decline by 49% in the period from 2008 to 2014 compared with the period from 2004 to 2007. Based on this and other assumptions, the IMF predicted a substantial drop in medium-term growth for emerging Europe. By spring 2010, capital inflows to some – but not all – of these countries had resumed, and the focus of the debate shifted back to making the best use of capital inflows, and notably to finding an appropriate balance between the tradable and nontradable sector (IMF, 2010).

3 Stylized Facts

In this section, we provide some stylized facts about the key variables used in the empirical analysis conducted in section 4 of the paper, namely industrial production (excluding construction), exports and the stocks of FDI and portfolio investment in the CESEE countries for the period 1995–2009. Looking first at the index of industrial production (excluding construction), a rather steady increase can be observed both in the CESEE aggregate (chart 1) and the individual CESEE countries (chart A1 in the annex). In addition, the impact of the 2008 crisis is clearly visible in almost all countries under review.

Turning to exports, the (unweighted) CESEE aggregate also shows an upward trend over time until the international economic and financial crisis hit the region in 2008 (chart 1). The rate of growth for the regional aggregate accelerated around 2003, i.e. just before the EU accession of eight CESEE countries. A look at the development of exports country by country (chart A2 in the annex) shows some country-specific differences, for example with regard to the severity of the impact of the 2008 crisis, but the overall picture is rather homogeneous.

A closer look at the scaling of the indices shows, however, that the growth rate of industrial production was much less pronounced than that of exports. Whereas a number of countries in the sample, e.g. Bulgaria, Croatia, Lithuania, Latvia and Romania, managed to increase their exports from around 50% of the 2004 level, measured at the beginning of the observation period, to almost 300% of that level just before the crisis, the corresponding growth pattern for industrial production seems much more modest and ranges generally from around 80% of the 2004 level in the late 1990s to around 150% of that level before the start of the crisis. The differences in the relative development of these indicators suggest that the CESEE economies became substantially more open over time.

The development of the stocks of FDI and portfolio investment also shows a strong increase over time. For these stock variables, the impact of the 2008 economic and financial crisis is, however, less visible than for exports and industrial production. By contrast, the step change in growth around the time of EU accession in 2004 is more noticeable for the stocks of FDI and portfolio investment than for the other two indicators. The country-specific panels in the annex (chart A3

¹¹ In a related analysis on a much larger sample of countries, Abiad et al. (2009) find that output tends to be substantially depressed following banking crises with no rebound to the pre-crisis trend. The recent international economic and financial crisis did not, however, result in “classic” banking crises in the CESEE region, thus limiting the applicability of these findings.

and chart A4) show that cross-country differences are also more pronounced than for the other two variables. With May 2004 again being the base level, the FDI stock in some CESEE countries, such as Bulgaria, Hungary and Romania, had increased by a factor of around five to six by 2009.

Overall, the stylized facts about the key variables we use in the analysis below suggest some strong similarities, in particular a dynamic growth pattern up until the outbreak of the economic and financial crisis in the CESEE region in 2008, the (more or less pronounced) positive change in the rate of growth around the time of EU accession and different degrees of heterogeneity across countries.

4 Empirical Analysis

4.1 Tests of Export- and FDI-Led Growth

In this part we analyze the determinants of industrial production. We are aware that the theoretical literature concentrates on the relationship between trade, FDI and productivity. However, productivity growth is generally associated with growth of industrial production. Moreover, we use levels of production in order to distinguish between productivity and efficiency changes. The latter, also referred to as jobless growth (Onaran, 2007), have played an important role in CESEE countries. By using growth of industrial production, we adjust productivity growth for employment reductions in industry.

A major problem for the empirical analysis relates to the availability and quality of the necessary data. Because standard quarterly time series are relatively short, we use monthly proxies including industrial production and exports. Stocks of FDI are interpolated into monthly data because there are no monthly proxies for these time series. Given the high persistence of FDI stocks, this is not likely to bias the results. All variables are in logs and are seasonally adjusted by means of the standard X12 seasonal filter. Standard unit root tests confirm that all variables can be considered as integrated variables.¹²

The modern literature on trade, FDI and productivity concentrates on the analysis of individual firm data. However, this introduces also several limitations on empirical analysis. Most importantly, consistent microeconomic data are usually not available for longer periods and on a cross-country basis. This applies in particular to microdata for CESEE countries. Therefore, we concentrate on aggregate data for industrial production, exports and FDI for 11 CESEE economies (Bulgaria, the Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). For most countries, the data start in 1995. For some countries data are only available from the end of the 1990s.

We use the stock of inward FDI, because outward FDI is generally not important in CESEE. On the one hand, this corresponds with the investment-led growth hypothesis. On the other hand, outward FDI may have ambiguous effects. In particular, it can support domestic production by supplying cheap intermediate materials. It can also increase the demand potential for domestic products. However, outward FDI can also have a negative effect on domestic production if it is related to the outsourcing of labor-intensive parts of the production process. The CESEE countries lend themselves to testing the investment-led growth hypothesis, because only a few large firms in the region are also active as investors abroad.

¹² Detailed results are available upon request from the authors.

Output, exports, and the stock of FDI are expected and found to be nonstationary. We therefore estimate the following vector error correction (VEC) model:

$$\Delta X_t = \alpha\beta X_{t-1} + \sum_{i=1}^p A_i \Delta X_{t-i} + \varepsilon_t \quad (1)$$

where vector X includes output and the selected variable of foreign activity (exports or FDI). Furthermore, the long-run relationship includes also the deterministic components (intercept and – if necessary – a trend). Moreover, we include several dummy variables, which cover special factors. Growth improved in nearly all CESEE countries after EU accession in 2004 and 2007. Early reform periods were often characterized by a deterioration in economic performance, which is significant especially in Poland, Romania and Slovakia. The recent financial crisis put a damper on growth in nearly all CESEE countries whereas the Russian crisis of 1998 and 1999 reduced growth especially in the Baltic States, Poland and the Czech Republic. In addition, there was a country-specific financial crisis in the Czech Republic in 1997. Finally, the euro's introduction in Slovenia and Slovakia in 2007 and 2009, respectively, is expected to have had an impact on economic developments in these countries.

While the cointegration approach corresponds to the time series properties of the analyzed data, this approach also reflects that all variables are possibly endogenous. On the one hand, exports or investment abroad are expected to react to productivity growth. On the other hand, output might catch up as a result of exports and investment, which enhance productivity (the theoretical literature does not discuss this channel, though). The coefficients estimated on the error correction term, which are the elements of the vector α , show how important these channels are for specific variables. In particular, we present the likelihood ratio test on the restriction that α equals zero,

$$H_0: \alpha_i = 0 \quad (2)$$

For the previous analysis on growth determinants Granger causality tests are often used (e.g. Marin, 1992). However, as these tests are based on differenced data, they provide insights into the short-run dynamics between the variables. Therefore, the concept of long-run weak exogeneity is more appropriate for cointegrating time series (Ericsson, Hendry and Mizon, 1998).

4.2 Empirical Results and Weak Exogeneity Tests

We start with the estimation of the export-led growth hypothesis (table A1 in the annex). Panel B shows that a robust cointegrating relationship between industrial production and exports can be found for all the selected countries. In other words, the null of no cointegration is clearly rejected by both of the presented cointegration tests. Panel A reports the estimated cointegration relationships. In general, we see a strong relationship between exports and production. The coefficients are very close to unity in all countries, with the exception of the Czech Republic and Slovenia. A surprisingly high coefficient is only found for Estonia (1.9). The cointegration tests confirm that the estimated relationship is a cointegrating relationship for all countries.

When we compare these results with the results for the relationship between industrial production and FDI (table A2), we see that this relationship is slightly weaker. In particular, the cointegration tests present weaker evidence on the existence of a cointegrating relationship between industrial production and FDI for Bulgaria, the Czech Republic and Slovakia. This outcome may, however, also reflect data restrictions, given that the stock of FDI relates to the whole economy and not only to the industrial sector.

Despite these problems, we get cointegrating relationships between FDI and industrial production in all countries. FDI seems to be a highly significant determinant of industrial production in all CESEE countries (and particularly so in Lithuania and Slovakia), which broadly confirms the FDI-led growth hypothesis for the countries in the region.

Table A3 presents the results for portfolio investment, which performs much worse than the previous specifications. This is – also in view of some empirical studies mentioned above – not really surprising, because portfolio investments are less related to technology transfers than FDI. More specifically, a cointegration relationship appears to exist only for Latvia, Lithuania and Poland. However, the coefficient for portfolio investment in the growth equation for Lithuania is negative and the coefficient for Latvia is low compared to previous FDI-based estimations.¹³ Overall, the results do not provide much support for possible growth effects of portfolio investments in the CESEE region.

Further insights can be gained from the inspection of the estimated coefficients for the correction terms. In particular, the last panels of tables A1 and A2 present the results of the weak exogeneity tests, i.e. the likelihood ratio tests of the restriction that a particular adjustment coefficient is set to zero. This constraint should be rejected if a particular variable adjusts to deviations from the common trend. The results of the estimations with portfolio investments are not presented, because we did not find stable cointegrating relationships for these specifications.

The weak exogeneity tests show that in many cases either production or external activity is important for long-run growth. For approximately one-third of countries we confirm that both variables are endogenous. For Bulgaria, Croatia, Estonia (only for exports), Hungary, and Lithuania (only for FDI), the weak exogeneity tests indicate that industrial production is not influenced by the external variable in the long run. As a result, the export-led growth and/or FDI-led growth hypothesis is rejected in these cases. Instead, foreign activity appears to have adjusted to growth in these countries. In turn, output growth in Poland, Romania, Slovakia and Slovenia profited highly from exports and FDI. The remaining economies do not show a clear pattern of growth.

We tested the robustness of the presented results in several ways. First, we excluded observations before 2000. Similarly, we excluded observations after the Lehman crisis in September 2008. Both tests confirmed the stability of the main findings, but they reduced the number of observations. We also estimated a specification with industrial production, exports and FDI. For the majority of countries we received similar results as in the previous cases. In some countries

¹³ For the remaining countries, the estimated long-run relationships are often insignificant (e.g. Slovakia), low in comparison to previous FDI coefficients (e.g. Slovenia) or negative (e.g. Croatia).

(e.g. Croatia), cointegration tests indicated two cointegrating relationships, which were more difficult to interpret. Therefore, we present only the pair-wise results.

5 Conclusions and Policy Recommendations

As of 2008, the CESEE economies were strongly affected by the economic and financial crisis, with the effects being mainly transmitted through the trade and financial channel (Gardó and Martin, 2010). All countries of the region suffered from severe declines of external demand and much lower (at times even negative) capital inflows. The growth implications for the region were dramatic. In fact, the CESEE region was more seriously affected than any other region worldwide, with performance being especially low when compared to other EMEs, notably China and India (Fidrmuc and Mayer, 2010).

The main question addressed in this paper is whether the long-term growth prospects of the CESEE countries are likely to have deteriorated as well. To answer this question – even though the prospects for external demand and capital inflows are still unknown – we look at the interlinkages between capital flows, exports and industrial production. Our results indicate that exports and the stock of FDI in the CESEE region are positively related to industrial production and thus economic growth. In nearly all CESEE countries under review, exports and FDI have a significant impact on industrial growth performance. Exports seem to be more important than the stock of FDI, but this may at least partly reflect statistical problems. By contrast, portfolio investment seems to be only weakly related to the industrial growth performance of the CESEE countries.

Finally, our results show that the relationship between trade, FDI and growth is highly complex. We confirm that both variables are endogenous. Output growth in Poland, Romania, Slovakia and Slovenia profited highly from exports and FDI. However, the weak exogeneity tests indicate that in the long run industrial production was not influenced by the external variables in Bulgaria, Croatia, Estonia, Hungary and Lithuania. As a result, the export-led growth and/or FDI-led growth hypothesis is rejected in these cases.

A number of policy implications can be derived from this analysis. First, the positive link between the FDI stock and industrial production implies that the CESEE countries should strive to remain attractive locations for inward FDI. To this end, they may apply a diverse set of policy measures ranging from macroeconomic stability including sound fiscal policy to microeconomic (structural) reforms, e.g. to create a business-friendly regulatory environment and flexible labor markets. Second, our results indicate that a reduction of portfolio investments is unlikely to have significant repercussions for the growth prospects of the region. In fact, the literature on capital inflows suggests that large portfolio inflows may at times entail economic risks. Third, the CESEE countries should undertake suitable policies to enhance their export prospects, both specific measures, such as export promotion, and more general macro- and microeconomic policy reforms, which are often closely related to action that helps support countries' attractiveness for FDI inflows.

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Annex

Table A1

Industrial Production and Exports in Selected CESEE Countries

	Bulgaria	Czech Republic	Croatia	Estonia	Hungary	Latvia
Period	2000:3–2009:12	1995:4–2009:12	1995:4–2009:12	1998:4–2009:11	1995:4–2009:10	1999:1–2009:11
A. Estimation Results						
Lags	1	2	2	2	2	2
No. of observations	118	177	177	140	175	131
Exports	1.135	0.472	0.694	1.933	0.779	0.916
t-stat	12.997	8.651	19.348	5.996	18.852	8.599
Intercept	1.481	1.133	1.989	–3.564	–2.601	3.941
Included dummies	eu07, fincrisis, fincrisis2	czcrisis, rucrisis, eu04, fincrisis		rucrisis, eu04, fincrisis	eu04	fincrisis, eu04
B. Cointegration Tests						
Trace statistics	18.140 **	18.321 **	37.734 ***	18.911 **	28.359 ***	15.536 **
p-value	0.020	0.018	0.000	0.015	0.000	0.049
ME statistics	17.968 **	18.174 **	36.589 ***	16.815 **	24.829 ***	14.669 **
p-value	0.012	0.012	0.000	0.019	0.001	0.043
C. Weak Exogeneity Tests						
Industrial production	0.485	15.513 ***	3.045 *	1.469	1.774	4.229 **
p-value	0.486	0.000	0.081	0.226	0.183	0.040
Exports	14.974 ***	1.765	27.109 ***	13.837 ***	7.018 ***	4.172 **
p-value	0.000	0.184	0.000	0.000	0.008	0.041

Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), czcrisis (1997 Czech financial crisis), rucrisis (1998–1999 Russian financial crisis), fincrisis (financial crisis 2008:9–2009:12), fincrisis2 (2009:1–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table A1 continued

Industrial Production and Exports in Selected CESEE Countries

	Lithuania	Poland	Romania	Slovakia	Slovenia
Period	1997:4–2009:12	1995:4–2009:10	1995:4–2009:12	1995:3–2009:11	1995:4–2009:12
A. Estimation Results					
Lags	2	2	2	2	2
No. of observations	153	175	177	177	177
Exports	0.675	0.761	0.875	0.820	0.368
t-stat	16.093	10.920	7.620	9.950	18.587
Intercept	2.338	0.549	1.038	–0.775	1.688
Included dummies		early reforms, eu04	early reforms, eu07	eu07, skeuro, delayed reforms	
B. Cointegration Tests					
Trace statistics	16.507 **	20.521 ***	24.608 ***	21.062 ***	22.695 ***
p-value	0.035	0.008	0.002	0.007	0.004
ME statistics	16.089 **	20.377 ***	21.381 ***	19.312 ***	21.209 ***
p-value	0.026	0.005	0.003	0.007	0.003
C. Weak Exogeneity Tests					
Industrial production	11.853 ***	13.567 ***	10.922 ***	5.882 **	19.359 ***
p-value	0.001	0.000	0.001	0.015	0.000
Exports	1.235	0.903	4.089 **	3.072 *	5.481 **
p-value	0.266	0.342	0.043	0.080	0.019

Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), early reforms in Poland (1995–1999), early reforms in Romania (1995–1997), delayed reforms in Slovakia (1995:1–1998:10), skeuro (euro introduction in Slovakia, 2009:1–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Industrial Production and FDI in Selected CESEE Countries

	Bulgaria	Czech Republic	Croatia	Estonia	Hungary	Latvia
Period	2000:3–2009:9	1995:4–2009:9	1995:4–2009:9	1998:4–2009:9	1995:4–2009:9	1999:1–2009:9
A. Estimation Results						
Lags	1	2	2	2	2	2
No. of observations	115	174	174	138	174	129
FDI	0.457	0.268	0.451	0.516	0.789	0.314
t-stat	8.759	4.767	8.509	12.494	9.379	2.413
Trend						–0.013
t-stat						–5.254
Intercept	2.138	2.010	1.933	1.142	–4.328	–4.859
Included dummies	eu07, fincrisis	czcrisis, fincrisis, rucrisis, eu04		rucrisis, fincrisis	eu04	rucrisis, eu04, fincrisis
B. Cointegration Tests						
Trace statistics	15.384*	16.369**	50.073***	29.905***	54.505***	36.030***
p-value	0.052	0.037	0.000	0.000	0.000	0.002
ME statistics	15.380**	13.598*	48.160***	27.708***	53.839***	34.136***
p-value	0.033	0.064	0.000	0.000	0.000	0.000
C. Weak Exogeneity Tests						
Industrial production	2.474	10.140***	3.814*	17.936***	0.514	26.825***
p-value	0.116	0.001	0.051	0.000	0.473	0.000
FDI	13.895***	1.971	43.846***	9.503***	50.107***	8.075***
p-value	0.000	0.160	0.000	0.002	0.000	0.004

Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), czcrisis (1997 Czech financial crisis), rucrisis (1998–1999 Russian financial crisis), fincrisis (financial crisis 2008:9–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table A2 continued

Industrial Production and Exports in Selected CESEE Countries

	Lithuania	Poland	Romania	Slovakia	Slovenia
Period	1997:4–2009:9	1995:4–2009:9	1998:1–2009:9	1995:4–2008:12	1996:5–2009:9
A. Estimation Results					
Lags	2	2	2	2	2
No. of observations	150	174	141	165	172
FDI	1.715	0.685	0.342	0.976	0.157
t-stat	4.878	6.386	9.257	3.694	5.727
Trend				–0.019	
t-stat				–2.995	
Intercept	–3.980	–0.737	2.302	1.614	3.107
Included dummies		d95, early reforms, rucrisis, eu04, fincrisis	eu07, fincrisis	eu04, delayed reforms, skerm, skeuro	eu04, sleuro, fincrisis
B. Cointegration Tests					
Trace statistics	18.493**	19.664**	29.485***	29.454**	19.508**
p-value	0.017	0.011	0.000	0.017	0.012
ME statistics	15.309**	19.158***	28.982***	18.987*	16.999**
p-value	0.034	0.008	0.000	0.057	0.018
C. Weak Exogeneity Tests					
Industrial production	2.447	11.414***	21.085***	7.779***	14.196***
p-value	0.118	0.001	0.000	0.005	0.000
FDI	9.462***	6.282**	11.718***	0.696	0.278
p-value	0.002	0.012	0.001	0.404	0.598

Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), rucrisis (1998–1999 Russian financial crisis), fincrisis (financial crisis 2008:9–2009:12), d95 (dummy for 1995), early reforms in Poland (1995–1999), early reforms in Romania (1995–1997), delayed reforms in Slovakia (1995:1–1998:10), skerm (Slovakia's ERM participation, 2005:11–2008:12), skeuro (euro introduction in Slovakia, 2009:1–2009:12), sleuro (euro introduction in Slovenia, 2007:1–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table A3

Industrial Production and Portfolio Investment in Selected CESEE Countries

	Bulgaria	Czech Republic	Croatia	Estonia	Hungary	Latvia
Period	2000:3–2009:9	1995:4–2009:9	1995:6–2009:9	1998:4–2009:9	1995:4–2009:9	1999:1–2009:9
A. Estimation Results						
Lags	1	2	2	2	2	2
No. of observations	115	174	172	138	174	129
PI	0.952	1.020	–0.209	6.596	1.514	0.573
t-stat	2.593	3.832	–1.717	3.017	7.207	5.621
Trend	0.012					
t-stat	6.091					
Intercept	1.433	–3.907	5.643	–30.100	–12.066	3.729
Included dummies	eu07, fincrisis	czcrisis, fincrisis, rucrisis, eu04		rucrisis, fincrisis	eu04	rucrisis, eu04, fincrisis
B. Cointegration Tests						
Trace statistics	17.640	14.349*	15.726**	12.267	14.366*	23.605***
p-value	0.369	0.074	0.046	0.145	0.073	0.002
ME statistics	14.714	12.238	13.337*	9.602	13.389*	20.739***
p-value	0.210	0.102	0.070	0.239	0.068	0.004

Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), czcrisis (1997 Czech financial crisis), rucrisis (1998–1999 Russian financial crisis), fincrisis (financial crisis 2008:9–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Table A3 continued

Industrial Production and Portfolio Investment in Selected CESEE Countries

	Lithuania	Poland	Romania	Slovakia	Slovenia
Period	1997:4–2009:9	1995:4–2009:9	1998:1–2009:9	1995:4–2008:12	1995:4–2009:9
A. Estimation Results					
Lags	2	2	2	2	2
No. of observations	150	174	141	165	174
PI	–0.031	1.829	0.703	0.028	0.193
t-stat	–0.506	6.494	4.151	0.256	4.315
Trend				0.003	
t-stat				2.258	
Intercept	4.527	–8.450	1.404	–4.016	2.967
Included dummies		d95, early reforms, rucrisis, eu04, fincrisis	eu07, fincrisis	eu04, delayed reforms, skerm, skeuro	eu04, sleuro, fincrisis
B. Cointegration Tests					
Trace statistics	19.954***	33.413***	12.874	9.620	24.463***
p-value	0.010	0.000	0.120	0.940	0.002
ME statistics	16.886**	33.019***	12.787*	8.063	13.312*
p-value	0.019	0.000	0.085	0.816	0.070

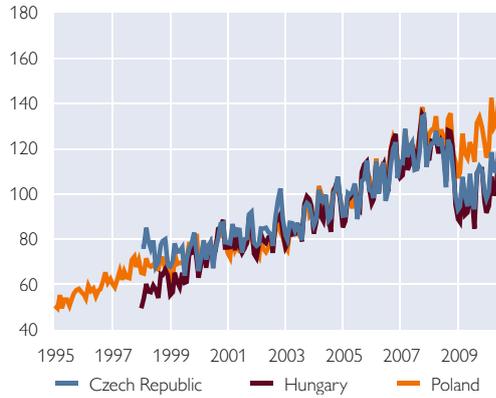
Source: Authors' estimations.

Note: The following dummy variables are not reported: eu04 (2004:5–2009:12), eu07 (2007:1–2009:12), rucrisis (1998–1999 Russian financial crisis), fincrisis (financial crisis 2008:9–2009:12), d95 (dummy for 1995), early reforms in Poland (1995–1999), early reforms in Romania (1995–1997), delayed reforms in Slovakia (1995:1–1998:10), skerm (Slovakia's ERM participation, 2005:11–2008:12), skeuro (euro introduction in Slovakia, 2009:1–2009:12), sleuro (euro introduction in Slovenia, 2007:1–2009:12). ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

CESEE Industrial Production (excluding Construction)

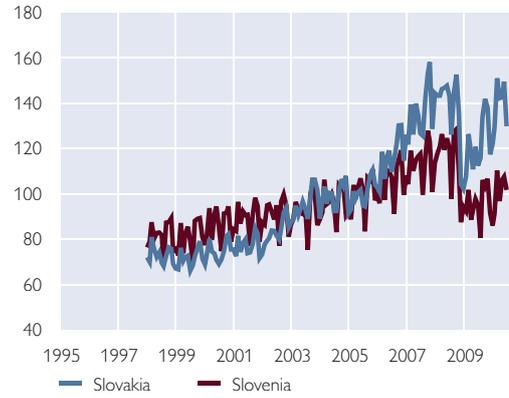
Central and Eastern Europe I

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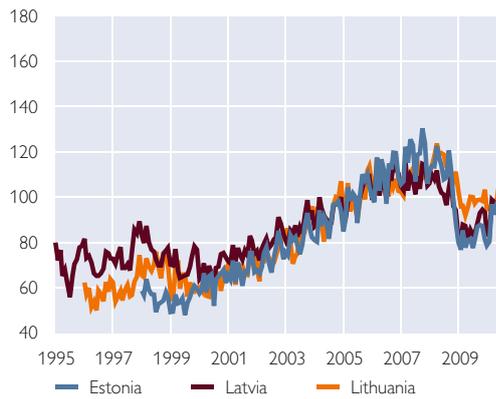
Central and Eastern Europe II

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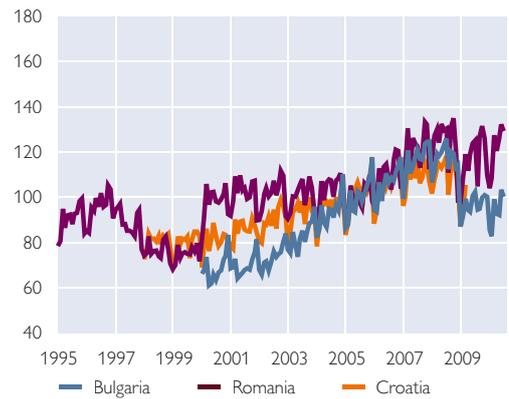
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Southeastern Europe

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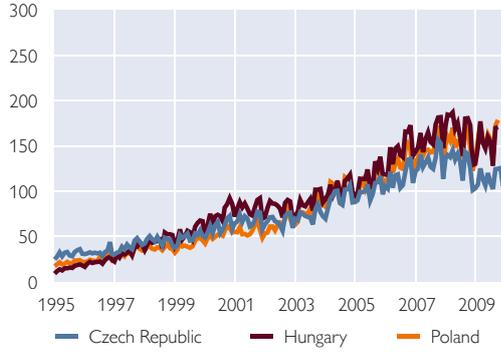
Source: IMF, ECB, OeNB.

Chart A2

CESEE Exports

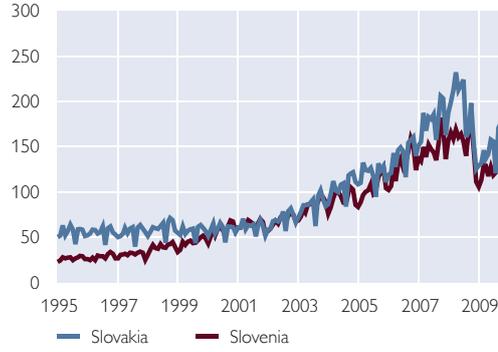
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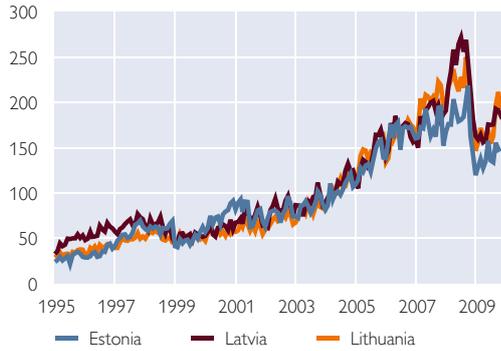
Central and Eastern Europe II

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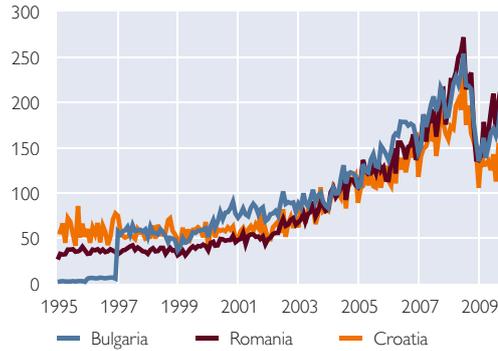
Baltic States

May 2004=100



Southeastern Europe

May 2004=100



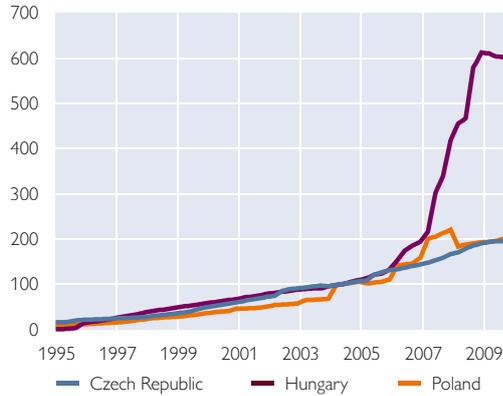
Source: IMF, ECB, OeNB.

Chart A3

FDI Stock in CESEE

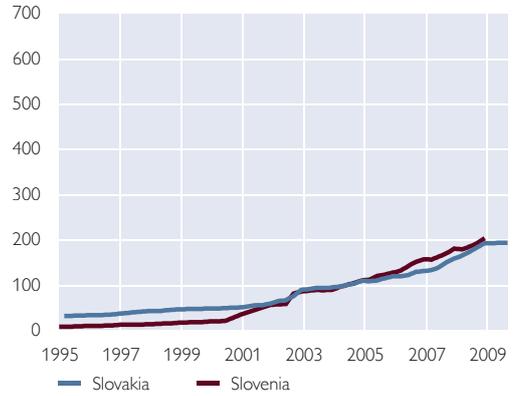
Central and Eastern Europe I

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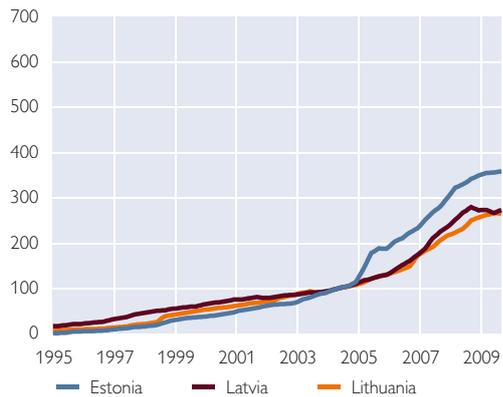
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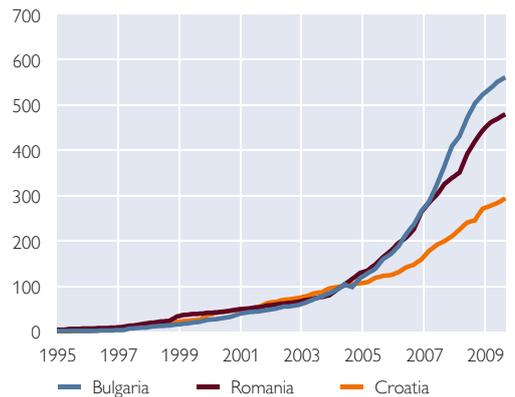
Baltic States

May 2004=100



Southeastern Europe

May 2004=100



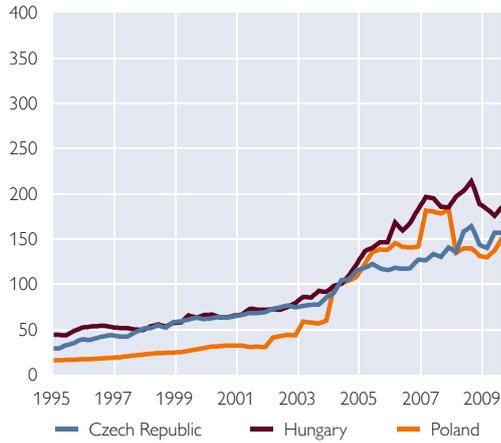
Source: IMF, ECB, OeNB.

Chart A4

Portfolio Investments in CESEE

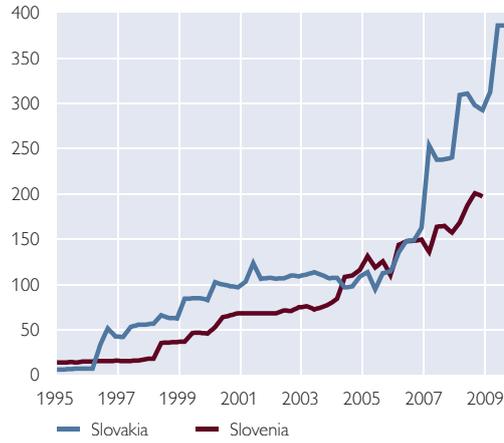
Central and Eastern Europe I

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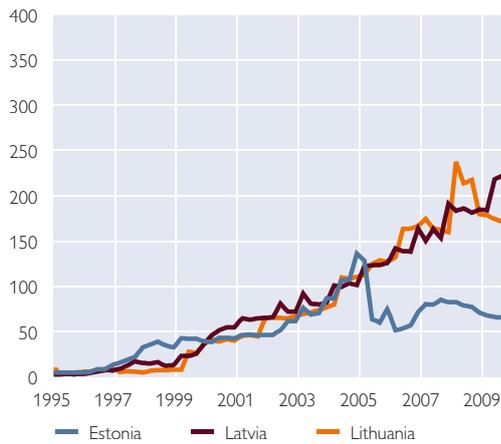
Central and Eastern Europe II

May 2004=100



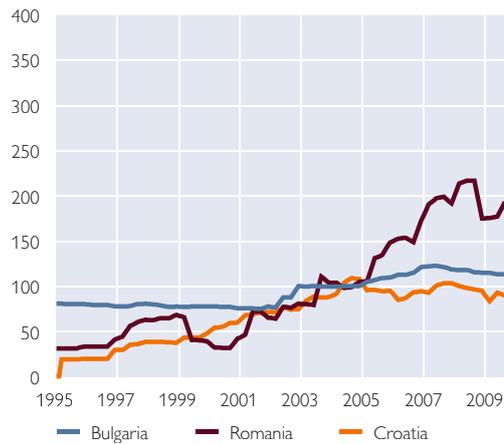
Baltic States

May 2004=100



Southeastern Europe

May 2004=100



Source: IMF, ECB, OeNB.

Addresses of the Oesterreichische Nationalbank

	Postal address	Telephone/Fax/E-mail
Head Office Otto-Wagner-Platz 3 1090 Vienna, Austria Internet: www.oenb.at	PO Box 61 1011 Vienna, Austria	Tel: (+43-1) 404 20-6666 Fax: (+43-1) 404 20-2399 E-mail: oenb.info@oenb.at
Branch Offices		
Northern Austria Branch Office CoulinstraÙe 28 4020 Linz, Austria	PO Box 346 4021 Linz, Austria	Tel: (+43-732) 65 26 11-0 Fax: (+43-732) 65 26 11-6399 E-mail: regionnord@oenb.at
Southern Austria Branch Office Brockmann-gasse 84 8010 Graz, Austria	PO Box 8 8018 Graz, Austria	Tel: (+43-316) 81 81 81-0 Fax: (+43-316) 81 81 81-6799 E-mail: regionsued@oenb.at
Western Austria Branch Office Adamgasse 2 6020 Innsbruck, Austria	Adamgasse 2 6020 Innsbruck, Austria	Tel: (+43-512) 594 73-0 Fax: (+43-512) 594 73-6599 E-mail: regionwest@oenb.at
Representative Offices		
London Representative Office Oesterreichische Nationalbank 48 Gracechurch Street, 5 th floor EC3V 0EJ, London, United Kingdom		Tel: (+44-20) 7623-6446 Fax: (+44-20) 7623-6447
New York Representative Office Oesterreichische Nationalbank 450 Park Avenue, Suite 1202 10022, New York, U.S.A.		Tel: (+1-212) 888-2334 Fax: (+1-212) 888-2515
Brussels Representative Office Oesterreichische Nationalbank Permanent Representation of Austria to the EU Avenue de Cortenbergh 30 1040 Brussels, Belgium		Tel: (+32-2) 285 48-41, 42, 43 Fax: (+32-2) 285 48-48

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Most of the research papers published in Focus on European Economic Integration are subject to a double-blind peer review process to ensure a high level of scientific quality. The editors in chief wish to thank the following researchers for their work and diligence in reviewing the studies published in Focus on European Economic Integration in the period from 2008 to 2010 (in alphabetical order):

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