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ABSTRACT

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This Paper analyses performance of the transition economies in the Central and Eastern European (CEE) countries in terms of their convergence in selected macroeconomic fundamentals. The analysis uses monthly data on industrial output, money aggregate (M1), consumer prices and producer prices from 1991 to 1998. The analysis is carried out within distinctive groups of countries based on different trade and geographical arrangements and uses a panel unit-root test as an econometric tool. In general, we conclude that the transition CEE countries were not successful in achieving a certain degree of natural economic integration among them so far. Certain levels of convergence occurred only for a limited number of countries at the advanced stage of transition process.

JEL Classification: C23, E65, F15, O11, P52
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NON-TECHNICAL SUMMARY

This Paper analyses performance of the transition economies in the Central and Eastern European (CEE) countries in terms of their convergence in selected macroeconomic fundamentals. The transition process in Central and Eastern Europe provides a unique opportunity to carry out a quantitative analysis of convergence in selected macroeconomic variables within distinctive groups of CEE countries based on different trade and geographical arrangements. Thus, we extend a growth convergence methodology to a set of selected macroeconomic fundamentals in order to obtain a broader picture of one part of the economics of transition. The analysis uses monthly data on industrial output, consumer prices, producer prices and money aggregate (M1) from 1991 to the end of the first quarter of 1998.

Theoretically, there are several reasons why one could expect the convergence of macroeconomic variables of CEE countries to occur. First, all CEE engage quite heavily in international trade with each other. International trade (the flow of capital and goods), if bilateral, serves as a natural means of coordinating the economic development of the parties involved. The second factor that might induce a certain degree of convergence between CEE countries is the prospect of their accession to the European Union (EU). Since the mid-1990s these countries have been confronted with the list of criteria upon which EU conditioned the acceptance of new member countries. These criteria are common for all applicants for the EU membership. Thus, adjustments of monetary and fiscal policy motivated by the attempt to fulfill them should inevitably result in similar trends of macroeconomic fundamentals.

When testing for convergence we find no strong evidence of convergence in macroeconomic fundamentals among the CEE countries in general. However, tests performed on several groups of countries offer a more detailed account. The strongest result shows a high degree of convergence in the growth of industrial output among the Czech Republic, Poland and Hungary.

Tests performed on the money aggregate (M1) and consumer and producer prices show that almost no convergence occurred among the listed groups of countries. A certain degree of convergence in the evolution of both consumer and producer prices occurred only among the group of the Baltic states. We attribute this to the comparable starting conditions of the Baltic states after their monetary separation from the former Soviet Union and to the similar policy of tying the exchange rates of their national currencies to stronger foreign currencies, thus importing lower inflation from abroad.

In general, though, we conclude that the transition CEE countries have not been successful in achieving a certain degree of natural economic integration among them so far. The tests for convergence in macroeconomic fundamentals among the CEE countries show that a limited level of convergence has occurred only for a restricted number of countries at the advanced stage of transition process.

1. Introduction and Motivation

This paper analyzes performance of the transition economies in the Central and Eastern European (CEE) countries in terms of their convergence in selected macroeconomic fundamentals. The analysis uses data from 1991 to 1998 and employs econometric tools supported by the theory of economic convergence. The transition process in Central and Eastern Europe provides a unique opportunity to carry out a quantitative analysis of convergence in selected macroeconomic variables within distinctive groups of CEE countries based on different trade and geographical arrangements. Thus, we extend a growth convergence methodology to a set of selected macroeconomic fundamentals in order to obtain a broader picture of one part of the economics of transition.

Any country in transition must undergo a stage of macroeconomic stabilization, which is inevitably accompanied by large shocks to macroeconomic fundamentals. The nature and magnitude of these disruptions affect the progress of economic development. Due to the relative openness and the close economic relations between transition economies in Central and Eastern Europe, economic interactions, or the lack thereof, are likely to be revealed by the behavior of macroeconomic fundamentals. Research into the success of the stabilization programs in transition economies is important for citizens as well as for policy makers.

In this point, nearly a decade into transition process, the CEE countries have completed early stages of the process. During the ongoing transformation the CEE countries launched various privatization programs and adopted an extensive range of measures to perform monetary and fiscal policies that would suit the needs of overall transformation. Aside from private investors, numerous international organizations got involved to foster the process. The economic transformation of the CEE countries has shared various common features ranging from institutional changes promoting market economy to practical issues like exchange rate regime or inflow of foreign direct investment to industries with comparative advantage.

This paper aims to address the question of whether the transition countries have achieved a path of economic development eventually leading to a certain degree of convergence. The countries in question are the Czech Republic, Slovakia, Hungary, Poland, Slovenia, Romania, Bulgaria, Albania, Estonia, Latvia, and Lithuania. These countries have several common features in terms of their transition. All of them

embarked on an uneasy road to the privatization of state owned companies that had to undergo a critical restructuralization along the way. At the same time these countries have striven to establish a workable framework for international trade and cooperation to facilitate the transition process. Thus the question arises of how successful the countries were in achieving a certain degree of natural economic integration among them. One way of answering this question is to perform a test for convergence in macroeconomic fundamentals among the CEE countries.

Theoretically, there are several reasons why one could expect the convergence of macroeconomic variables of CEE countries to occur. First, all CEE engage quite heavily in international trade with each other. Being the flow of capital and goods, international trade (if bilateral) serves as natural means of coordination of economic development of the parties involved. The second factor that might induce certain degree of convergence between CEE countries is the prospect of their accession to the European Union (EU). Since middle of the 90's these countries have been confronted with the list of criteria upon which EU conditioned the acceptance of new member countries. These criteria are common for all applicants for the EU membership. Thus, adjustments of monetary and fiscal policy motivated by the attempt to fulfill them should inevitably result in similar trends of macroeconomic fundamentals.

When we compare the situation in the developed countries of the EU we find evidence of convergence in macroeconomic variables along with the presence of institutional arrangements. For example, the EU countries participating in the European Monetary System (EMS) already have a record of exchange rate convergence. Sarno (1997) found evidence of long-run convergence for both nominal and real exchange rates that was more frequent in countries that adhered to the Exchange Rate Mechanism (ERM) than for the non-ERM countries. This suggests that the ERM of the EMS has been effective in reducing the tendency towards exchange rate misalignment, at least among its own members. Kočenda and Papell (1997) found evidence of a dramatic convergence in inflation rates among the countries that adhered to the ERM. The results therefore suggest that a significant increase in policy convergence has been achieved within the EMS. As we draw a previous parallel, the importance of various institutional frameworks of the CEE countries must not be underestimated.

The paper is organized as follows. Section 2 describes the data and conceptual approach. Section 3 describes the econometric methodology used in testing the

convergence of exchange rate differentials. Section 4 presents the empirical findings. A brief conclusion follows.

2. Data and Choice of Groups

The study uses monthly data from the following eleven countries: the Czech Republic, Slovakia, Hungary, Poland, Slovenia, Romania, Bulgaria, Albania, Estonia, Latvia, and Lithuania. A note should be made as for why other countries, such as Russia, Ukraine and Belarus were not included in our analysis as well. The first reason is rather technical and concerns the availability and reliability of data, which in these countries is often questionable. Only very recently have these countries adopted the IMF standards for data collection and purification and beside this fact the frequent changes in measuring methodology make their data rather inconsistent. Finally, inflation in Russia, Ukraine and Belarus, which grew at much faster pace then in CEE countries, makes the related price time series much steeper and much more suspect to a measurement error.[1]

The other reason is more of an institutional nature because Russia, Ukraine and Belarus exhibit quite substantial institutional differences when compared to the eleven countries above. Also Russia and Belarus form a strong union and as such their mutual relationship is quite different from their relations to other countries. And last but not least, since the transition in Russia, Ukraine and Belarus has proceeded much more slowly than in CEE countries, it would be overly optimistic to anticipate any kind of convergence between them and CEE countries.

The time span of the data is from January 1991 to March 1998. The monthly data on industrial output, money aggregate (M1), consumer prices, and producer prices were compiled from the International Monetary Fund's International Financial Statistics in order to ensure the reliability of the data set employed. Bulletins of the statistical offices and of national banks of the countries in question were used as well in order to ensure data consistency. The evolution of all available variables is presented in graphical form in Figures 1-4. Table 1 displays their basic statistics: average and standard deviation of their growth rates.

[1] It is doubtful whether statistical offices can accurately measure inflation at such high levels as observed for the CEE countries during transition. For example, between 1990 and 1997 cumulative increases in prices ranged from 200% in the Czech and Slovak Republics to 24,000,000% in Ukraine.

The data of all four time series cited above are not stationary for any country under scrutiny (we present the results of ADF test in Table 2). The analysis is therefore performed on the logarithmic differences. The data originate in various countries and by their nature may contain polynomial trends of different degrees. Thus, differencing as a way of achieving stationarity is preferred to that over detrending the data. The logarithmic differences of each variable (V_t) are calculated with 12 month lag (e.g. lnV_t - lnV_{t-12}) in order to eliminate the time dependent fluctuations that arise on both the real and nominal sides of the economy. The nature of the fluctuations may be seasonal as well as administrative.[2] Table 3 shows that taking logarithmic differences, indeed, helps to achieve stationarity for majority of the series.

We use industrial output as a proxy for the gross domestic product (GDP) because the former variable is recorded on a monthly basis unlike the latter one. This measure allows us to form panels of dimensions large enough to yield reliable results based on a technique described in the next section. The use of nominal industrial output also eliminates any bias that might stem from the use of different measures of inflation. Industrial output as a subset of GDP consists by definition of several parts, among which are investments and consumption. The cyclical behavior of investments in transition economies is well documented and consumption exhibits a cyclical pattern as well.

For social rather than economic reasons, most transition countries favor a gradual liberalization of prices. This approach ranges from retail prices to regulated prices in selected markets. The deregulation steps are usually announced ahead of time and taken at pre-scheduled dates. Such administrative measures then create several price level jumps each year and the process affects both consumer and producer prices.

For the purpose of further analysis the countries were pooled in several logically differentiated groups. There are a maximum of 84 observations per country and the dimension of each panel data structure changes accordingly. Because of our aim to employ only reliable and consistent data certain panels are unbalanced. Table 4 shows all the countries that were included in our analysis and describes the composition of the various groups for which we tested the convergence hypothesis.

The first three groups of countries reflected the institutional aspects of transition reforms. Specifically, the arrangement regarding international trade among the CEE

[2] It should be noted that the annual growth rate calculated monthly will tend to smooth out the time series

countries was taken into account. Such an arrangement was institutionalised in March 1993 as the Central European Free Trade Agreement (CEFTA). The “Original CEFTA” group is comprised of the founding countries: the Czech Republic, Slovakia, Hungary, Poland, and Slovenia. For the sake of institutional consistency we also constructed a “Current CEFTA” group by adding Romania to the original CEFTA group despite the fact that Romania joined the CEFTA only in 1996. On other hand we intentionally did not include Bulgaria to this group because Bulgaria became member only very recently, in 1998. In order to explore convergence development within the three leading economies of the Central European region we pooled together the Czech Republic, Hungary, and Poland to form the Leading Three group. Further, we constructed two other groups of countries: the Balkan Group (Romania, Bulgaria, and Albania) and the Baltic Group (Estonia, Latvia, and Lithuania). The last two groups reflect geographical and historical aspects of economic performance. Pooling countries in certain groups is meant to show not only the consistency, but also the sensitivity of our results.

A detailed description of the method of testing for convergence follows in the next section, which concentrates on investigating logically structured groups of countries to see how the differences in various macro variables evolved over time, i.e. whether they increased or diminished.

3. Convergence Methodology

The large body of empirical literature on economic growth has already prompted research for testing growth convergence among various countries. Convergence in the key economic variables may be researched with the use of several methods. Baumol (1986), Barro (1991), and Barro and Sala-i-Martin (1991, 1992), among others, pioneered the conventional approach that examined cross-sectional relationships between the per capita growth rate over time and its initial level. The later research of Bernard and Durlauf (1995) showed that this conventional approach is too simple and is valid only under very strong assumptions.

A following econometrical methodology, which was exploited in several published studies, relies upon weaker assumptions and utilizes a combination of cross-sections of individual time-series. It was first used by Ben-David (1995, 1996) who performed an analysis of real per-capita income growth on numerous countries. Kočenda and Papell

(1997) applied this methodology to study inflation convergence in the European Union. Papell (1997) tested purchasing power parity for the real exchange rates of 20 developed countries. Kočenda and Hanousek (1998) tested for convergence and integration of Asian capital markets.

We employ the above methodology, i.e. the panel unit-root test, in order to fully exploit the effect of cross-variances in a pooled time series of moderate length. The theory was derived by Levin and Lin (1992) that showed that the statistical power of a unit root test for a relatively small panel may be of an order of magnitude exceeding the power of the test for a single time series.[3] Previous applied econometric research has demonstrated the specific advantages of utilizing panel data in studying a wide range of economic issues. Generally, cross-sectional variation that is present in the panel data improves the estimation of underlying parameters; thus, test for the significance of such parameters have greater power.[4]

The analysis is performed on inter-temporal changes in the macroeconomic variables listed in the previous section. These changes are measured as changes in the respective variables in the same period of the previous year. The individual change in the variable V_t is defined as

$$X_t = lnV_t - lnV_{t-12} \tag{1}$$

where V_t denotes the value of the respective variable at time t.

We model the growth evolution of macroeconomic variables for a group of i individual countries with observations spanning over t time periods as the following autoregressive process:

$$X_{i,t} = \alpha + \phi X_{i,t-1} + \varepsilon_{i,t} \tag{2}$$

[3] Levin and Lin (1992) developed the asymptotic properties of unit root tests on panel data as both the time-series and cross-section dimensions grow arbitrarily large. In the case of i.i.d. disturbances, the unit root t-statistic converges to the N(0,1) distribution; due to the presence of a unit root, the convergence occurs more quickly as the number of time periods grows than as the number of individuals grows. In the cases of individual-specific fixed effects or serial correlation in the disturbances, the unit root t-statistic diverges, but in each case a straightforward transformation of the t-statistic does converge to N(0,1) The paper also presents Monte Carlo results on the finite-sample properties of the unit root t-statistics for a wide range of panel dimensions likely to be encountered in applied research.

[4] Aside from previously mentioned studies see, for example, Maloney and Azevedo (1995).

The fact that the variables are modeled as an autoregressive process is based on common practice in the literature and does not represent any theory of how this variable is determined. It also constitutes a suitable form for the convergence test introduced later in this section.

The convergence measure adopted here is based on a relationship that describes the dynamics of the differentials of the respective variables in a panel setting. Formally, we can transcribe this as follows:

$$X_{i,t} - \overline{X_t} = \phi\left(X_{i,t-1} - \overline{X_{t-1}}\right) + u_{i,t} \tag{3}$$

where $\overline{X_t} = \frac{1}{n}\sum_{i=1}^{n} X_{i,t}$. In the presence of pooling, the intercept α vanishes since, by construction, the differentials have a zero mean over all the countries and time periods. How the countries are pooled into different groups was described in detail in the previous section.

Convergence in the above context requires that the differentials of the respective variables become smaller and smaller over time. For this to be true ϕ must be less than one. On other hand, ϕ greater than one indicates a divergence of these differentials. The value of ϕ itself then tells us about the degree of convergence. From the construction of the test it follows that, as the value of the statistically significant coefficient ϕ approaches zero, the convergence effect becomes greater. Implicitly, as the value of the statistically significant coefficient ϕ approaches unity, the convergence effect decreases and vanishes.

Recent work has established that a sub-unity convergence coefficient ϕ is indeed a robust indication of convergence which is respectively true for divergence when $\phi > 1$. Ben-David (1995) performed 10,000 simulations for each of three possible cases where data should portray the processes of convergence, divergence, and neutrality. His numerous simulations provide ample evidence of convergence or divergence when these features truly reflect the situation. When neutral data with no strong inclination in either direction are used, the convergence coefficient ϕ tends towards unity.

The convergence coefficient ϕ for a particular group of countries can be obtained using the Dickey and Fuller (1979) test on equation (3). The augmented version of this test

(ADF) is used in order to remove possible serial correlation from the data. Since the analysis is performed on panel data of logarithmic differences (changes) of selected variables, there will be no intercept by construction. Denoting the differential of variable $X_{i,t}$ as $d_{i,t} = X_{i,t} - \overline{X_t}$, and its difference as $\Delta d_{i,t} = d_{i,t} - d_{i,t-1}$, the equation for the ADF test is written as

$$\Delta d_{i,t} = (\phi - 1) d_{i,t-1} - \sum_{j=1}^{k} \gamma_j \Delta d_{i,t-j} + z_{i,t} \tag{4}$$

where the subscript i = 1,..., k indexes the countries in a particular group. Equation (4) then tests for a unit root in the panel of differentials. The null hypothesis of a unit root is rejected in favor of the alternative of level stationarity if $(\phi - 1)$ is significantly different from (less than) zero. This implicitly means that we test whether convergence coefficient ϕ is significantly different from (less then) one. To evaluate the statistical significance of the convergence coefficient ϕ we used the critical values for panel unit-root tests tabulated by Levin and Lin (1992).

The number of lagged differences (k) in equation (4) is determined using the parametric method proposed by Campbell and Perron (1991) and Ng and Perron (1995). An upper bound of the number of lagged differences $k_{\max}$ is initially set at the appropriately chosen level.[5] The regression is estimated and the significance of the coefficient γ_k is determined. If the coefficient is not found to be significant, then k is reduced by one and the equation (4) is reestimated. This procedure is repeated with a diminishing number of lagged differences until the coefficient is found to be significant. If no coefficient is found to be significant in conjunction with the respective k, then k = 0 and a standard form of the Dickey-Fuller test is used in the analysis. A ten-percent value of the asymptotic normal distribution (1.64) is used to assess the significance of the last lag. The advantage of this recursive t-statistic method over alternative procedures where k is either fixed or selected in order to minimize the Akaike Information Criterion is discussed in detail by Ng and Perron (1995).

4. Empirical Findings

The results of convergence tests for all the constructed groups of countries are presented in Tables 5–8. Each table is devoted to the results for a particular macroeconomic variable. In order to translate the results from the tables properly, recall that by construction of the test, as the value of the statistically significant coefficient ϕ approaches zero, the convergence effect becomes greater. Implicitly, as the value of the statistically significant coefficient ϕ approaches unity, the convergence effect vanishes.

Table 5 presents the results of the convergence test performed on industrial production. The coefficient ϕ is far from being significantly different from one for both CEFTA groups and therefore we cannot conclude anything in these cases. Because of obstacles to obtaining reliable data, we are able to present the results for the CEFTA groups and the group of Leading Three countries but we were not able to compile reliable panels for both groups of Baltic and Balkan states.

In case of the Leading Three group it has to be noted that at the beginning of transition process these countries started from different conditions. In terms of GDP per capita the Czech Republic, for example, has had lower growth but also had a higher base. This was the opposite case in Poland and partially in Hungary as well. The different level of microeconomic restructuralization at the beginning of transition is another major factor affecting starting conditions of these three countries.

We have found that the coefficient ϕ for the group of the Leading Three countries is significantly different from (less then) one and its value is quite low. This indicates that a great degree of convergence in growth of industrial output has already been achieved among the Czech Republic, Poland, and Hungary. We suppose that from a substantial extent these countries attained a common path characterized by a high degree of integration due to the institution CEFTA described earlier.[6]

Table 6 presents the results of the tests performed on the money aggregate M1. The values of the majority of coefficients ϕ tend to be above 0.92 at 1 per cent significance level. This finding allows us to conclude that almost no convergence occurred among the listed groups of countries. The slightly better result in the case of the original

[5] $k_{max} = 7$ because we used monthly data. We also wanted to incorporate up to half-year lags between the monetary and real sides of economy.

[6] These countries have striven to establish a workable framework for international trade and cooperation in order to facilitate the transition process. As early as December 1991, former Czechoslovakia, Poland

CEFTA group (ϕ = 0.87) does not justify any substantial change to the previous general conclusion. The results do not point to any particular conclusion concerning monetary policies adopted in the countries within selected groups. The results merely indicate that with regard to the monthly additions to the amount of money in economy, the countries within selected groups have not proceeded in a manner that would became common to them over the time. The main reason for this is most likely the nature of the overall monetary policies that the countries adopted and implemented during the years of transition. The policies were naturally more restrictive or expansive at different stages of transition at which progress presumably varied across the countries. We suspect that other causes were the wide differences in schemes supporting domestic savings or the lack thereof, various pension schemes, as well as different kinds of financing at the corporate level.

The value of the coefficient ϕ is quite low in the case of the Balkan countries and hints at the higher degree of convergence when compared with the previous groups. As for the money aggregate it is the only exception. In light of real economic facts, the cause of this convergence should be attributed to rapidly pacing monetary expansion in these economies. Expansionary money creation was the way these countries tried to cope with their difficulties in an economic situation that has been far from stable so far.

Tables 7 and 8 bring forward results of convergence tests with regard to consumer and producer prices. As was the case of the money aggregate, the values of the majority of coefficients ϕ tend to be above 0.94 and are statistically significant. Thus, in these cases we can also conclude that almost no convergence occurred among the listed groups of countries with respect to the changes in their consumer and producer prices. Moreover, unreliable data prevented testing for the convergence of producer prices among the group of Balkan countries. The results compare critically to the results of convergence test performed with respect to consumer prices in the countries of the European Union where a remarkable convergence of inflation rates has occurred since the middle of the 1970's.[7]

A certain degree of convergence in the evolution of both consumer and producer prices nonetheless occurred among the group of the Baltic states. We attribute this

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and Hungary signed the so-called "European Agreements" with the European Union, and other CEE countries followed this initiative later.

[7] See Kočenda and Papell (1997) for a detailed account.

mainly to two facts. Firstly, the Baltic states had comparable starting conditions after their monetary separations from the former Soviet Union and have enjoyed strong economic relations among them as well. Secondly, the Baltic states followed a similar policy of adopting exchange rate regimes that allowed them to tie the exchange rates of their national currencies to stronger foreign currencies in a greater or lesser extent. Such behavior allowed them to import a lower inflation, the level of which they would presumably not have achieved had they behaved autonomously.[8]

5. Concluding Summary

The transition process in Central and Eastern Europe offers a unique opportunity to investigate whether the countries engaged in it follow a path that would tend to equalize their achievements. We carry out a quantitative analysis to test for convergence in selected macroeconomic variables within distinctive groups of the CEE countries. The formation of groups of transition countries is based on different trade and geographical arrangements. The analysis uses monthly data on industrial output, consumer prices, producer prices, and money aggregate (M1) from 1991 to the end of the first quarter of 1998.

When testing for convergence we find no strong evidence of convergence in macroeconomic fundamentals among the CEE countries in general. However, tests performed on several groups of countries offer more detailed account. The strongest result shows a high degree of convergence in the growth of industrial output among the Czech Republic, Poland, and Hungary.

Tests performed on the money aggregate (M1), and consumer and producer prices show that almost no convergence occurred among the listed groups of countries. A certain degree of convergence in the evolution of both consumer and producer prices occurred only among the group of the Baltic states. We attribute this to comparable starting conditions of the Baltic states after their monetary separation from the former Soviet Union and to the similar policy of tying the exchange rates of their national currencies to stronger foreign currencies, thus importing lower inflation from abroad.

In general, though, we conclude that the transition CEE countries have not been successful in achieving a certain degree of natural economic integration among them so

[8] For further discussion on the theory of this phenomenon see Giavazzi and Giovannini (1989)

far. The tests for convergence in macroeconomic fundamentals among the CEE countries show that a limited level of convergence has occurred only for a restricted number of countries at the advanced stage of transition process.

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Table 1
Averages and standart deviations of the percentage growth rates

Country	Average (st.deviation)			
	Ind. Production	**CPI**	**PPI**	**Money**
Czech Republic	1.35 (11.24)	0.78 (0.69)	0.46 (0.78)	1.14 (4.49)
Slovak Republic	1.63 (12.53)	0.74 (0.55)	0.55 (1.65)	0.94 (4.03)
Poland	0.38 (6.82)	2.69 (2.36)	2.09 (1.83)	3.66 (5.11)
Hungary	0.58 (9.87)	1.81 (1.46)	1.15 (4.16)	1.36 (2.41)
Romania	-0.23 (7.20)	7.41 (6.40)	7.51 (14.87)	5.18 (8.77)
Albania	N.A.	3.68 (6.13)	N.A.	2.52 (6.40)
Bulgaria	N.A.	10.81 (29.41)	11.99 (23.36)	6.71 (12.25)
Slovenia	0.64 (10.39)	1.76 (2.40)	1.51 (2.75)	2.99 (7.21)
Estonia	N.A.	4.38 (9.60)	1.59 (2.74)	4.24 (8.82)
Latvia	N.A.	4.08 (7.94)	0.73 (0.93)	2.07 (4.23)
Lithuania	0.14 (11.46)	5.19 (7.58)	5.78 (10.82)	3.20 (5.10)

Table 2
ADF test statistics

Country	Ind. production	CPI	PPI	Money
Czech Republic	1.99	3.14	3.67	0.89
Slovak Republic	1.86	3.09	3.10	2.35
Poland	0.30	0.81	1.26	3.56
Hungary	-0.06	2.56	1.76	0.79
Romania	-1.34	3.49	2.49	7.40
Albania	N.A.	2.55	N.A.	0.93
Bulgaria	N.A.	0.94	1.70	2.16
Slovenia	1.08	3.27	2.14	1.49
Estonia	N.A.	1.25	2.64	2.78
Latvia	N.A.	1.00	1.77	2.83
Lithuania	-0.95	1.09	0.81	2.64

Note: none of the statistics is significant at 10%.

Table 3
ADF test statistics for log(y)-log(y(-12))

Country	Ind. Production	CPI	PPI	Money
Czech Republic	-1.15	0.52	-0.44	-3.09***
Slovak Republic	-1.93*	-1.66*	-0.91	-0.80
Poland	-2.13**	-3.08***	-1.84*	-0.25
Hungary	-1.53	-1.60	-1.93*	-1.15
Romania	-1.67*	-1.69*	-0.66	-2.02**
Albania	N.A.	-1.80*	N.A.	-1.04
Bulgaria	N.A.	-1.55	-1.61	-2.20**
Slovenia	-2.47**	-1.23	-1.52	-3.18***
Estonia	N.A.	-2.24**	-2.78***	-1.21
Latvia	N.A.	-2.60***	-0.98	-1.01
Lithuania	-1.88*	-2.25**	-2.51**	-2.72***

Note: * denotes significance on at 10% level, ** at 5% level, *** at 1% level

Table 4
Groups of Countries

Group	Number	List of Countries in a Group
Original CEFTA	5	Czech Republic, Slovakia, Hungary, Poland, Slovenia
Original CEFTA plus Romania	6	Czech Republic, Slovakia, Hungary, Poland, Slovenia, Romania
Leading Three	3	Czech Republic, Hungary, Poland
Baltic States	3	Estonia, Latvia, Lithuania
Balkan States	3	Romania, Bulgaria, Albania

Number denotes a number of countries in a group.

Table 5
Industrial Output

Group	Number	ϕ	t-statistics	K
Original CEFTA	5	0.94	-.27	6
Original CEFTA plus Romania	6	0.84	-.84	6
Leading Three	3	0.71c	-2.00	5

Number denotes a number of countries in a group. Statistically significant at 5% (c) level. K denotes number of lags.

Table 6
Money Aggregate (M1)

Group	Number	ϕ	t-statistics	K
Original CEFTA	5	0.88a	-3.83	6
Original CEFTA plus Romania	6	0.93a	-2.92	3
Leading Three	3	0.93d	-1.77	6
Baltic States	3	0.92a	-3.70	3
Balkan States	3	0.64a	-5.66	5

Number denotes a number of countries in a group. Statistically significant at 1% (a) and 10% (d) level.
K denotes number of lags.

Table 7
Consumer Prices

Group	Number	ϕ	t-statistics	K
Original CEFTA	5	0.98a	-2.52	6
Original CEFTA plus Romania	6	0.98a	-3.55	6
Leading Three	3	0.98b	-2.50	6
Baltic States	3	0.85a	-6.08	4
Balkan States	3	0.92a	-3.64	1

Number denotes a number of countries in a group. Statistically significant at 1% (a) and 2.5% (b) level.
K denotes number of lags.

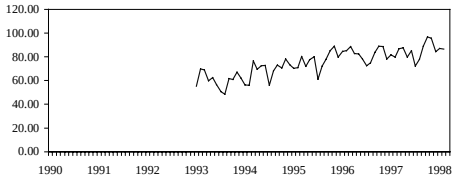
Table 8
Producer Prices

Group	Number	ϕ	t-statistics	K
Original CEFTA	5	0.94a	-3.51	0
Original CEFTA plus Romania	6	0.95a	-3.99	2
Leading Three	3	0.94a	-3.00	0
Baltic States	3	0.86a	-3.73	4

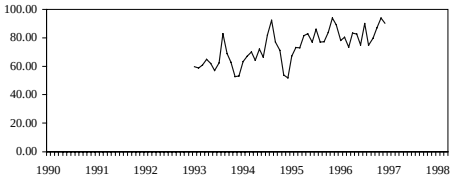
Number denotes a number of countries in a group. Statistically significant at 1% (a) level. K denotes number of lags.

Figure 1
Industrial Output

Czech Republic



Slovak Republic



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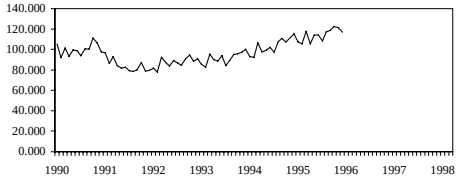

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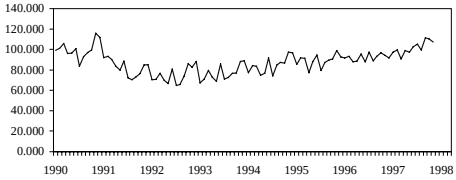

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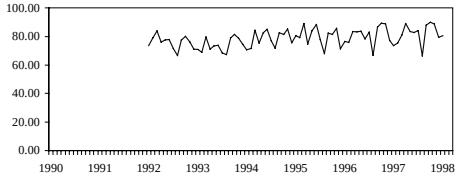

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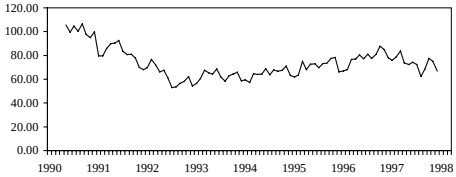

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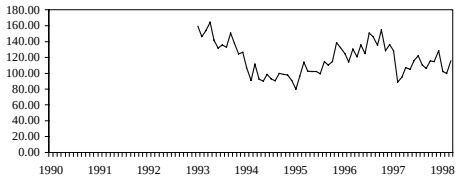
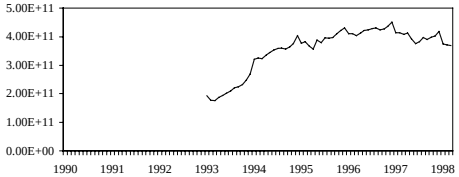


Figure 2
Money aggregate (M1)

Czech Republic



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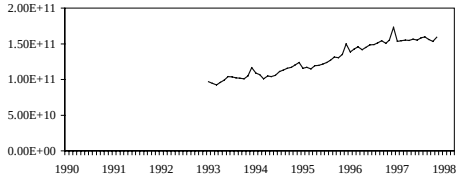

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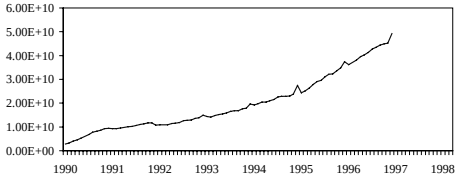

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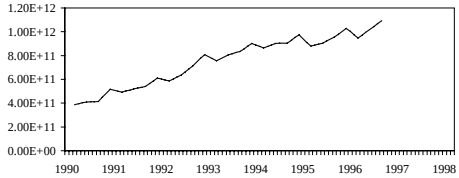

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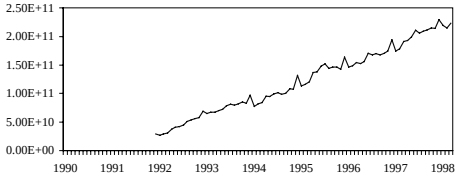

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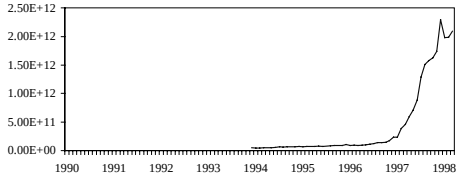

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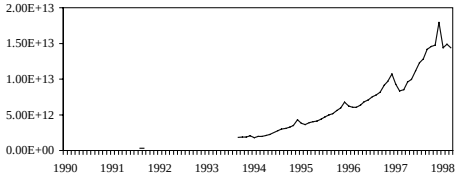

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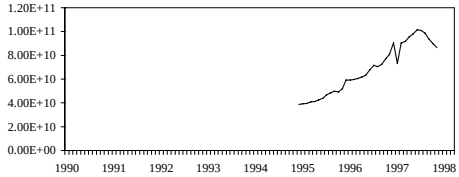

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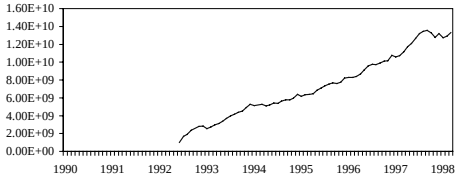

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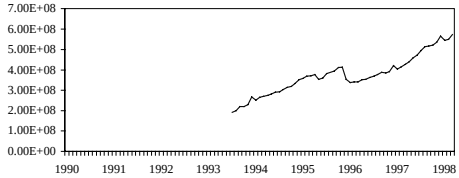

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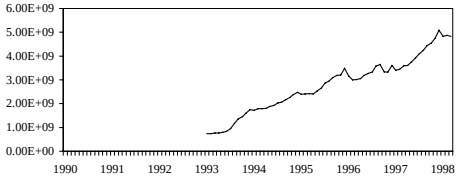
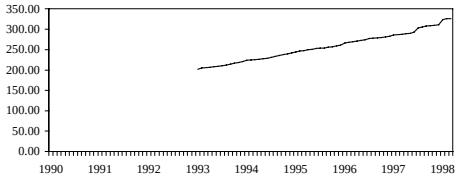


Figure 3
Consumer Price Index

Czech Republic



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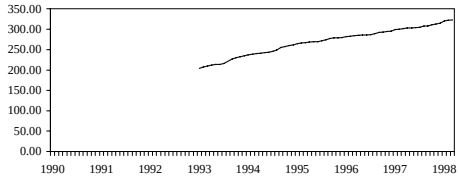

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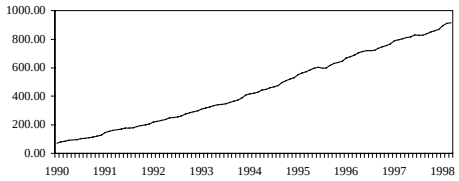

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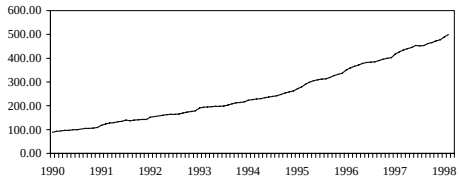
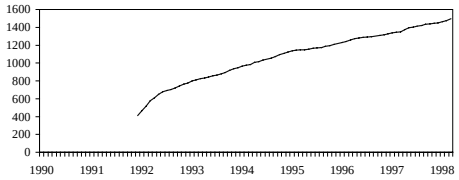


Slovenia



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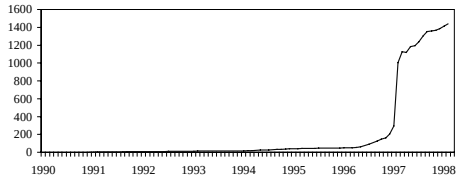
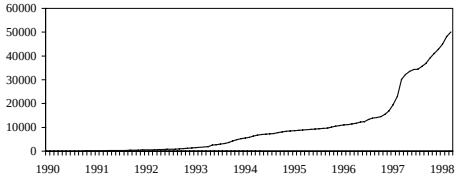


Romania



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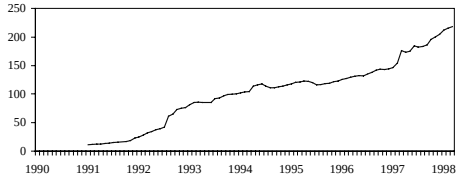
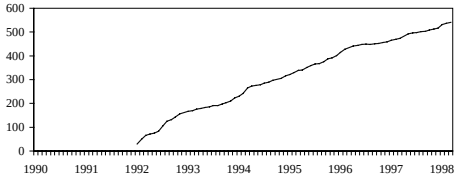
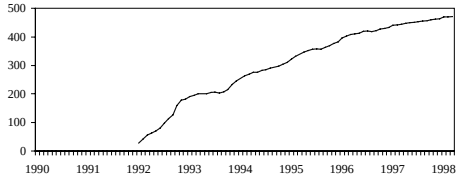


Estonia



Latvia



Lithuania

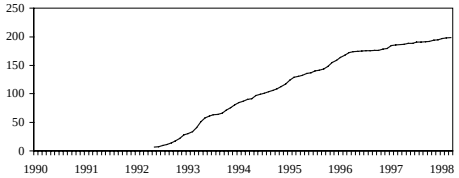
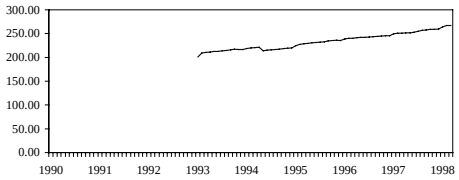
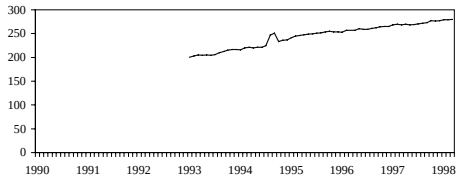


Figure 4
Producer Price Index

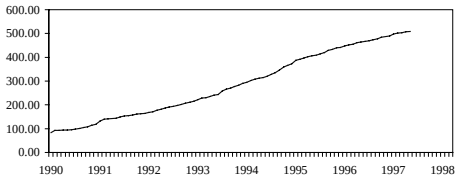
Czech Republic



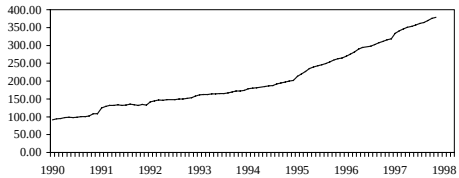
Slovak Republic



Poland



Hungary



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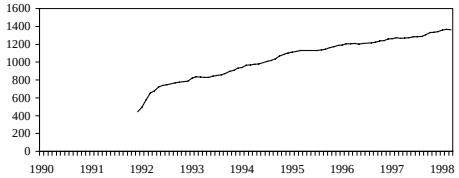

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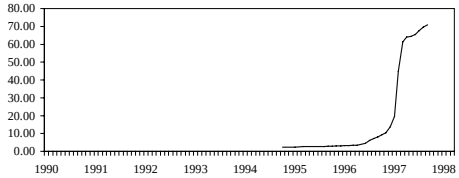

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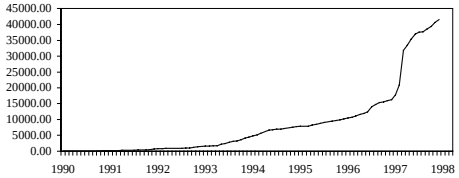

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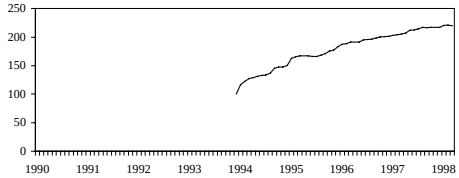

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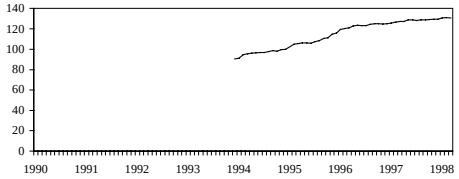
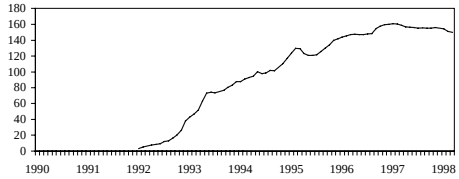
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