How far is Eastern Europe from Brussels?

Fischer, Stanley and Sahay, Ratna and Vegh, Carlos

International Monetary Fund

1998

IMF Working Paper

WP/98/53 INTERNATIONAL MONETARY FUND

How Far Is Eastern Europe from Brussels?

Prepared by Stanley Fischer, Ratna Sahay, and Carlos A. Végh[1]

April 1998

Abstract

The current destination of Central and Eastern European countries—explicitly for some, implicitly for all—is Brussels. The concept of the distance from Brussels is multi-dimensional. One simple measure, not without theoretical and empirical justification, is physical distance. This paper's focus, however, lies more in the distances in time and economic space. The paper first compares income gaps between Central and Eastern European and European Union (EU) countries, then evaluates recent economic performance in Central and Eastern Europe in light of EU standards. Finally; addresses the question of how long it will take the Central and Eastern European countries to close the income gap with EU countries.

JEL Classification Numbers: F15, F41, F43

Keywords: transition, convergence

Author's E-Mail Address: sfischer@imf.org; rsahay@imf.org; cvegh@ucla.edu

---

[1]Stanley Fischer is First Deputy Managing Director at the IMF; Ratna Sahay is Deputy Division Chief in the Research Department; and Carlos Végh, currently an Associate Professor at UCLA, was a Senior Economist at the Research Department when this paper was written. This paper was prepared for a special issue of *Weltwirtschaftliches Archiv* and was presented at the Kiel Week Conference on "Quo Vadis Europe?", held in Kiel, June 26–27, 1996. It was also presented at a conference on "The European Union and Central and Eastern Europe," organized by the Centre for European Policy Studies, and held in Liechtenstein, July 4–6, 1996. We thank Gérard Bélanger, David Bendor, Scott Brown, Carlo Cottarelli, Laszlo Csaba, Daniel Gros, Balasz Horvath, Russell Kincaid, Alfred Kammer, Peter Ludlow, Xavier Sala-i-Martin, Mohammed Shadman-Valavi, Nancy Wagner, Emmanuel Zervoudakis, and conference participants for insightful comments and suggestions. We are grateful to our IMF colleagues for making data available and for helping us interpret them, to Claire Adams for excellent research assistance, and to Catherine Fleck for excellent editorial assistance.

CONTENTS **Page**

Pages

Summary

At the end of the 1930s, today's transition countries in Central and Eastern Europe (CEE) were at very different levels of development. Starting at different times, and to differing extents, all of these countries were in the Soviet economic orbit until 1990. With the transition process now well under way, the question is where they are heading and how far they have reached.

The current destination—explicitly for some, implicitly for all—is Brussels. The concept of the distance from Brussels is multi-dimensional. One simple measure, not without theoretical and empirical justification, is physical distance. But, of course, the distances in which we are most interested are time and economic space.

We present three different concepts of distance from Brussels: income gaps between CEE and EU countries, relative macroeconomic performance, and CEE's progress in adopting market-based systems. We find that, while income gaps remain large, the richer CEE countries are not far from the low-income EU countries. Recent macroeconomic performance in CEE has been quite impressive and several important indicators are, by and large, close to the Maastricht criteria. Structural transformation toward a market-based system has been fairly rapid, with privatization and financial sector reform lagging behind. Based on long-run growth projections, we find that, on average, it may take about 30 years for CEE to catch up with the income levels in low-income EU countries. We also find that there is a very large gap between their actual GDP per capita in the 1990s and the level they would have reached had they followed the general convergence pattern of Western Europe. Our estimates show that it would take almost 25 years to make up for the lost time.

I. INTRODUCTION

At the end of the 1930s, today's transition countries in Central and Eastern Europe (CEE) were at very different levels of development.[2] Starting at different times, and to differing extents, all these countries were in the Soviet economic orbit until 1990. With the transition process now well under way, the question is where they are heading and how far down the road they are.

The present destination, explicitly for some, implicitly for all, is Brussels.[3] The concept of the distance from Brussels is multi-dimensional. One simple measure, not without theoretical and empirical justification, is physical distance. The interest in this measure comes from the well-known work of Herbert Giersch (1979), which relates the level of economic development in Europe to distance from Dusseldorf (for other measures, see Gros and Steinherr (1995)).

Chart 1 shows the geographical distance from Brussels of the capital of each of the 13 CEE countries included in this paper. Relative to countries already in the European Union (EU), CEE is not geographically far from Brussels. While no CEE capital is as near as that of most of the western European countries, most are closer than Helsinki and Lisbon, and all are closer than Athens. By this distance standard, the CEE countries meet EU norms.

But, of course, the distances in which we are most interested are in time and in economic space. In this paper, we first compare income gaps between the countries of CEE and those of the EU, then evaluate recent economic performance in CEE in light of EU standards, and finally address the question of how long it will take the CEE countries to close the income gap with EU countries.

A disclaimer and word of warning are in order before we begin. Forming an adequate judgment on how close a country is to Brussels requires detailed and sophisticated knowledge of the structure of the economy and its current and likely economic performance. We could not, even if we wanted to, form such a definitive judgment at this time. Rather, we seek here to provide a basis for further discussion by presenting various distance measures and relating them to economic performance and growth potential.

---

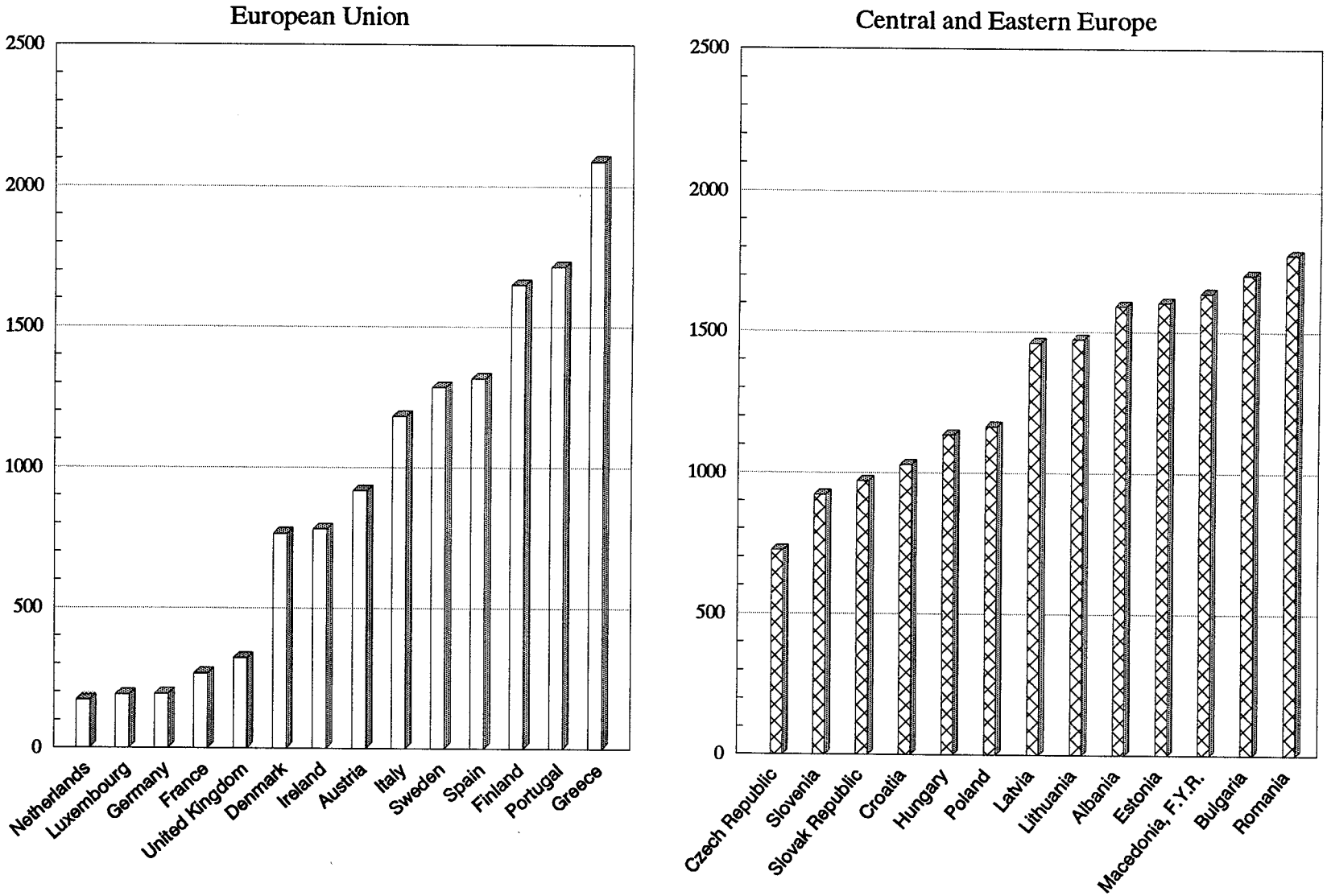
[2]The 15 Central and Eastern European (CEE) transition countries are Albania, Bulgaria, Bosnia-Herzegovina, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Former Yugoslav Republic of Macedonia, Poland, Romania, Federal Republic of Yugoslavia (Serbia-Montenegro), Slovak Republic, and Slovenia. In 1939, there were 10 countries, with the differences resulting from the breakups of Czechoslovakia and Yugoslavia. As a result of data difficulties, FRY (Serbia-Montenegro) and Bosnia-Herzegovina are excluded from this study.

[3]Most countries discussed in the paper are currently associate members of the European Union.

Chart 1. European Union, Central and Eastern Europe

Distance of Capital from Brussels

(In kilometers)



We present three different concepts of distance from Brussels: income gaps between CEE and EU countries, relative macroeconomic performance, and CEE's progress in adopting market-based systems. We find that, while income gaps are still large, the richer CEE countries are not far from the low-income EU countries. Recent macroeconomic performance in CEE has been quite impressive and several important indicators are, by and large, close to the Maastricht criteria. Structural transformation towards a market-based system has been fairly rapid, with privatization and financial sector reforms lagging behind. We also try to quantify the notion of distance from Brussels by asking how long it will take for CEE countries to catch up with EU countries. Based on long-run growth projections, we find that, on average, it may take about 30 years for CEE to catch up with the income levels in low income EU countries.

II. INCOME GAPS

Chart 2 and Table 1 show income levels of CEE countries. These are PPP estimates for 1995, from the IMF's World Economic Outlook (WEO) database.[4] While there is no overlap between the per capita income levels of CEE and the EU, it is worth noting that the levels in the more advanced CEE countries are quite close to those of some countries already in the EU. The highest 1995 PPP per capita income level in the CEE countries, that of the Czech Republic, was 7 percent below that of Greece, the lowest per capita income country in the EU. The gap between the poorest country in CEE, Albania, and the richest in the EU, Luxembourg, is enormous: per capita real GDP in Albania is shown as less than two percent that of Luxembourg.[5]

Table 2 compares levels of per capita income in several EU and CEE countries in 1937 and 1992; that is, before the rise of socialism in CEE and soon after its fall. The most striking observation is that the per capita income of each of the six CEE countries relative to the western European average worsened during this period. Hence, rather than converging towards western European levels, the CEE countries diverged considerably. For example, with a per capita income of 72 percent of the western European average in 1937, Czechoslovakia was very close to Austria, Greece, and Ireland. By 1992, with a per capita income of only 44 percent for the western European average, Czechoslovakia had fallen way behind all three countries. On the other hand, a cursory look at the relative position within western Europe suggests that income gaps have narrowed over the last 40 years.[6]

---

[4]The WEO data are in turn based on other sources, including the ICP (International Comparison Project) and the World Bank.

[5]The size of the gap reinforces our belief that available data for the transition economies underestimate GDP (see Fischer, Sahay, and Végh (1996a)).

[6]A formal test of convergence is presented below.

Chart 2. European Union, Central and Eastern Europe

1995 Per Capita Income

(In U.S. dollars, PPP based)

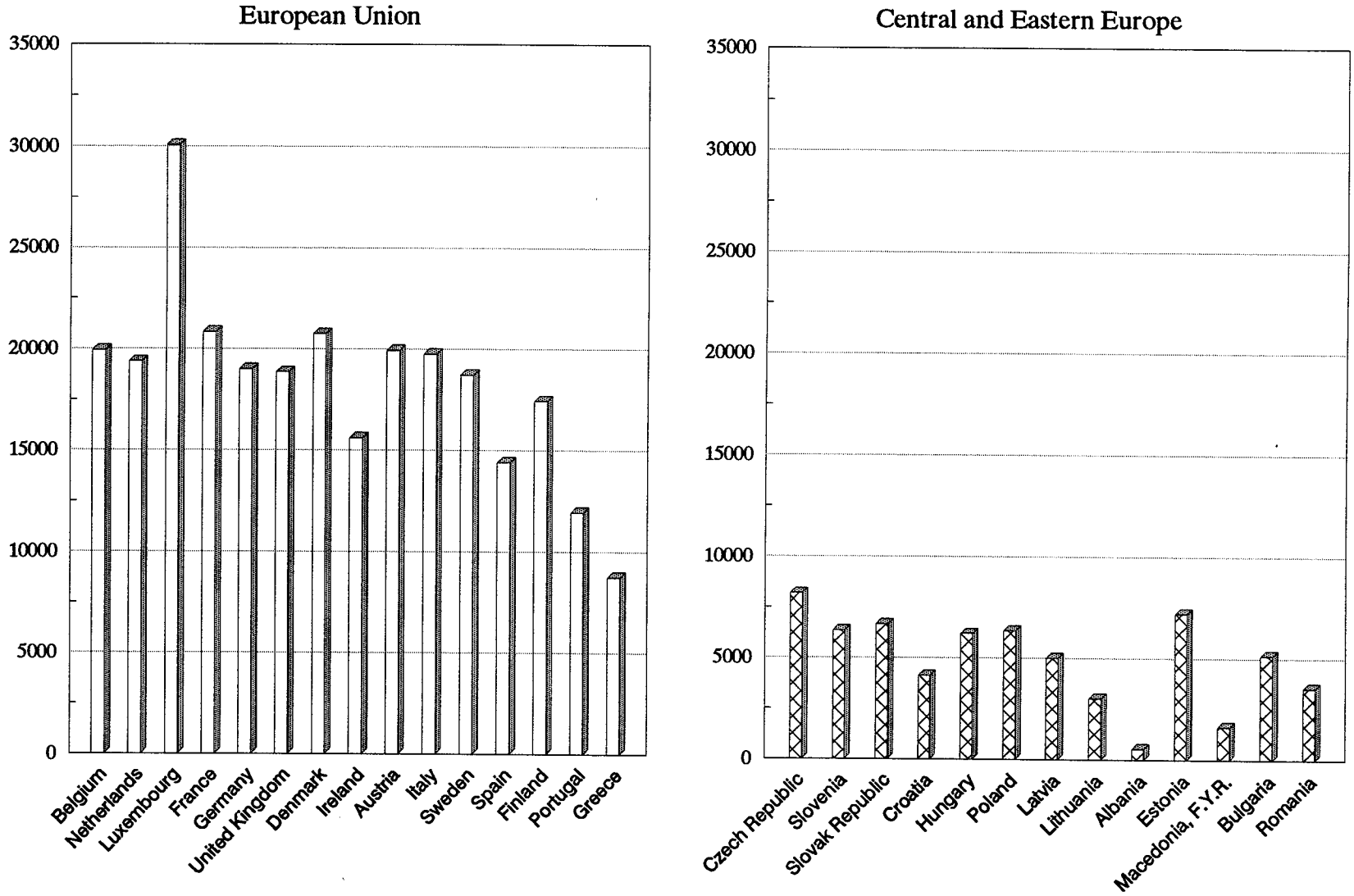


Table 1. European Union, Central and Eastern Europe
1995 Per Capita Income
(In U.S. dollars, PPP based)

European Union		Central and Eastern Europe	
Belgium	19928	Czech Republic	8173
Netherlands	19376	Slovenia	6342
Luxembourg	30063	Slovak Republic	6671
France	20829	Croatia	4142
Germany	18988	Hungary	6211
United Kingdom	18857	Poland	6364
Denmark	20737	Latvia	5002
Ireland	15611	Lithuania	3035
Austria	19922	Albania	538
Italy	19745	Estonia	7203
Sweden	18712	Macedonia, F.Y.R.	1628
Spain	14408	Bulgaria	5132
Finland	17433	Romania	3542
Portugal	11935		
Greece	8727		

Source: IMF, World Economic Outlook database.

Table 2. Selected European Countries: Comparison of Per Capita Income (PPP-based, in 1990 Geary-Khamis Dollars)

	1937		1992	
	GDP per capita	Relative to western European average	GDP per capita	Relative to western European average
Austria	3177	0.79	17160	1.11
Belgium	4915	1.22	17165	1.11
Denmark	5453	1.36	18293	1.18
Finland	3342	0.83	14646	0.95
France	4444	1.11	17959	1.16
Germany	4809	1.20	19351	1.25
Italy	3247	0.81	16229	1.05
Netherlands	5301	1.32	16898	1.09
Norway	3871	0.96	17543	1.13
Sweden	4664	1.16	16927	1.09
Switzerland	6087	1.51	21036	1.36
UK	5870	1.46	15738	1.02
Greece	2820	0.70	10314	0.67
Ireland	3018	0.75	11711	0.76
Spain	2043	0.51	12498	0.81
Turkey	1271	0.32	4422	0.29
Average	4021	1.00	15493	1.00
Bulgaria	1566	0.39	4054	0.26
Czechoslova	2882	0.72	6845	0.44
Hungary	2543	0.63	5638	0.36
Poland	1915	0.48	4726	0.31
Romania	1130	0.28	2565	0.17
Yugoslavia	1284	0.32	3887	0.25

Source: Maddison (1995).

Interestingly, and in sharp contrast to western European countries, the relative per capita income levels within the CEE remained largely unchanged, with Hungary and Czechoslovakia leading the pack both in 1937 and in 1992. This suggests that the predominant factor determining growth during this period was the common effect of socialism rather than country-specific policies, shocks, or initial conditions.

Chart 2 and Tables 1 and 2 raise the question of whether the divergence of income levels of the transition economies from those of western Europe that occurred during the communist period will now be reversed, and if so, at what speed. We approach the question by first examining policy convergence, and then considering other factors that will affect the rates at which convergence of income levels might take place.

III. MACROECONOMIC POLICY CONVERGENCE

The Copenhagen Summit criteria provide a very broad guiding principle in several areas for the accession of the CEE countries to the EU. While the political, legal, and institutional criteria cannot be overestimated, this paper focuses on the economic aspects. With no specific guidelines on economic performance for CEE membership in the EU, we choose to use the Maastricht criteria as a guiding principle for determining policy convergence.

The Maastricht criteria specify measures of macroeconomic convergence required for EMU membership.[7] The criteria relate to inflation, long-term interest rates, the general government budget deficit, gross government debt, and exchange rates. Specifically, consumer price inflation must not exceed that of the three best performing countries in the EU by more than 1.5 percentage points; interest rates on long-term government securities should not exceed the average of those in the same three (low-inflation) countries by more than 2 percentage points; the deficit to GDP ratio should not exceed 3 percent; the debt to GDP ratio should not exceed 60 percent; and the exchange rate should have been held within the normal fluctuation margins of the ERM for two years without a realignment.[8]

The CEE countries have made significant progress towards macroeconomic stability during the past five years. The average inflation rate in those countries has declined from about 480 percent in 1992 to 23 percent in 1995. Similarly, the average fiscal deficit has declined

---

[7]For a description of the criteria, see the IMF's *World Economic Outlook* (1996), pp. 40–43.

[8]As discussed in IMF (1996), the criteria leave some room for judgment.

from 5.3 to 3.1 percent of GDP. Chart 3 and Table 3 show how inflation rates and fiscal deficits in the CEE countries in 1995 compare with those of EU countries. The shaded area in the northwest corner of Chart 3 indicates values of those two variables that are consistent with the Maastricht criteria. While only one CEE country, Croatia, would have satisfied these two Maastricht measures, the fiscal performance of most CEE countries compares well with that of EU countries. Inflation rates in the CEE countries are generally significantly higher than those of the EU countries, but they have been declining. It is still true, though, that inflation rates in some of the best-performing CEE countries—Poland, Hungary, and the Baltic countries—have been declining quite slowly from the 20–40 percent range, reflecting the difficulty of reducing moderate rates of inflation to the levels of the G-7 countries.

The data on public debt that we present for CEE countries should be viewed as highly tentative.[9] Most CEE countries would appear to satisfy the Maastricht criterion on public debt, with Bulgaria and Hungary being the more noticeable exceptions. The last two criteria—on interest rates and exchange rates—are more difficult to evaluate. The interest rate criterion is hard to apply for CEE countries since markets for long-term debt are not well-developed. The criterion on exchange rates is, strictly speaking, not applicable for CEE countries since they do not share a regional exchange rate arrangement. Judged on the basis of no realignment for two years, however, most CEE countries would not meet the criterion with the exception of Estonia and Lithuania, which have currency boards.

IV. STRUCTURAL POLICY CONVERGENCE

The countries of CEE have made impressive progress in putting market mechanisms in place. This section presents evidence of the extent of structural policy reform in the CEE countries, based on indices computed by de Melo, Denizer, and Gelb (1995), who draw on qualitative indicators prepared by the European Bank for Reconstruction and Development (EBRD, 1994 and 1995).

Three measures of structural reforms have been produced, reflecting policies in different areas: price liberalization and competition (LII); trade and the foreign exchange regime (LIE); and privatization and banking reform (LIP). In turn, a weighted liberalization index from these three indices has been constructed, with weights of 0.3 for LII and LIE, and 0.4 for LIP. Although the work of Sachs and Warner (1995) suggests that trade and foreign exchange reform is the most critical area for growth, regression results in Fischer, Sahay, and Végh (1996c) suggest that privatization has been critical as well.

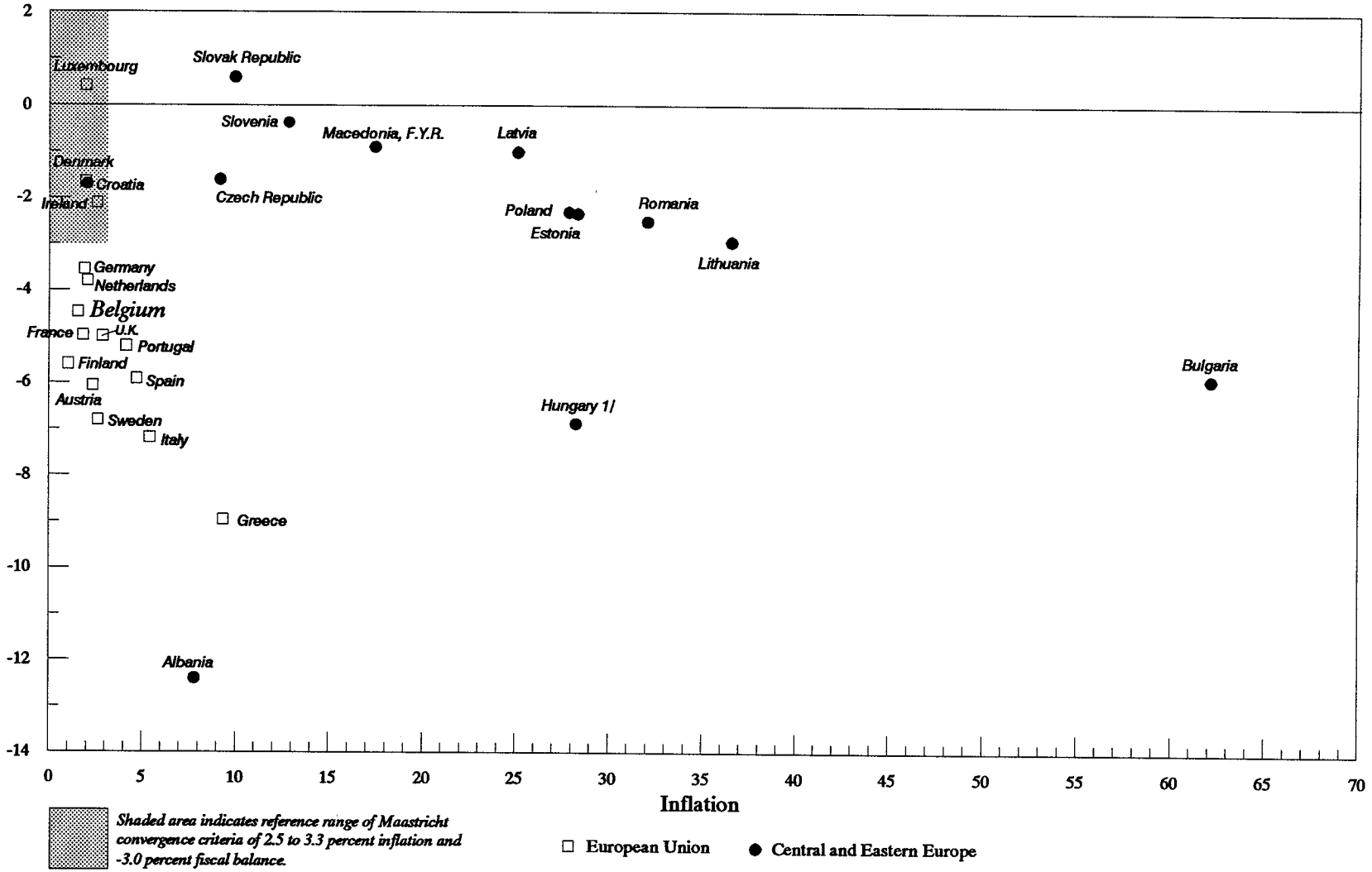
---

[9]Official figures are often not available; the figures in Table 3 are estimates provided by IMF country economists.

Chart 3. European Union, Central and Eastern Europe

Fiscal Balance and Inflation, 1995.

(in percent)



1/ Fiscal balance excludes privatization revenue; if included, fiscal balance would be -3.7 percent of GDP in 1995.

Table 3. European Union, Central and Eastern Europe: Inflation and Fiscal Balance, 1995.

(In percent)

	Inflation	Fiscal Balance (percent of GDP)	Public Debt 4/ (percent of GDP)
European Union			
Austria	2.3	-6.1	67
Belgium	1.5	-4.5	134
Denmark	1.9	-1.7	82
Finland	1.0	-5.6	60
France	1.8	-5.0	52
Germany	1.8	-3.5	58
Greece	9.3	-9.0	113
Ireland	2.5	-2.1	85
Italy	5.4	-7.2	123
Luxembourg	1.9	0.4	2
Netherlands	2.0	-3.8	79
Portugal	4.1	-5.2	73
Spain	4.7	-5.9	65
Sweden	2.6	-6.8	80
United Kingdom	2.8	-5.1	49
Central and Eastern Europe			
Albania	7.8	-12.4	62
Bulgaria	62.1	-5.9	101
Croatia	2.0	-1.7	39
Czech Republic	9.1	-1.6	13
Estonia	28.3	-2.3	7
Hungary 1/	28.2	-6.9	86
Latvia	25.1	-1.0	16
Lithuania	36.5	-2.9	12
Macedonia , F.Y.R. 2/	17.4	-0.9	40-70
Poland	27.8	-2.3	55
Romania	32.0	-2.5	21
Slovak Republic	9.9	0.6	33
Slovenia 3/	12.8	-0.3	25

Sources: IMF World Economic Outlook database and IMF staff estimates.

1/ Fiscal balance excludes privatization revenue; if included, fiscal balance would be -3.7 percent of GDP in 1995.

2/ Extent of sovereign debt not clearly established after the breakup of Yugoslavia.

3/ The portion of the external debt include Slovenia's estimated share of "uncollected debt" of the former Yugoslavia.

4/ Preliminary estimates for Central and Eastern Europe.

Chart 4 and Table 4 present measures of structural policy reform for the CEE countries. In principle, the indices could range from zero for a country in which no reform has taken place, to one for a country that has reformed completely.[10] The remarkable aspect of the data is the extent of structural policy reforms in the CEE countries. There is no country for which both price and trade liberalization has not been substantially accomplished. There is much more variation in the extent of privatization and banking reform, with Hungary, Estonia and the Czech Republic having achieved most by 1995, and Bulgaria, Romania, and Albania the least.

The aggregate index for each country in CEE exceeds 60 percent, and for the four countries with the highest overall index—the Czech Republic, Estonia, Hungary and Poland—the score is 89 percent or higher. Although these countries have gone a long way in carrying out reforms needed for a market economy, the underlying economic institutions are not necessarily at the same level as those in the EU—banking systems are still weak, corporate governance inadequate, and tax collection agencies not as effective in the new environment. Moreover, the ways in which the government and individual economic agents interact in ex-socialist countries today differs in many ways from the culture in countries with a long tradition of free markets. Strong liberalization measures are muted by bureaucratic inertia, the nature of policymaking bestowed by central planning, and local political resistance (Murrell, 1996, p. 32).

V. COMBINING THE INDICATORS

It would be convenient if the indicators presented in Charts 2 through 4 could be combined to give an overall measure of economic distance from Brussels. It would also be useful if the policy-related data in Charts 3 and 4 could be combined to yield an overall index of policy convergence. The creation of such indices would be easy if there were a high correlation among the different measures or indices. Table 5 shows correlations among the different variables, including distance and per capita income, based on data presented in Tables 1, 3 and 4.

Distance from Brussels is generally correlated with each of the indicators, supporting the notion that physical distance is closely correlated with economic distance. Among the three policy indicators, inflation, the fiscal balance, and the liberalization index, some correlations are small, particularly the one between inflation and the fiscal balance.

---

[10]Under this definition, a western European country would have an index of one.

Chart 4. Central and Eastern Europe
Economic Liberalization Indices
(1995)

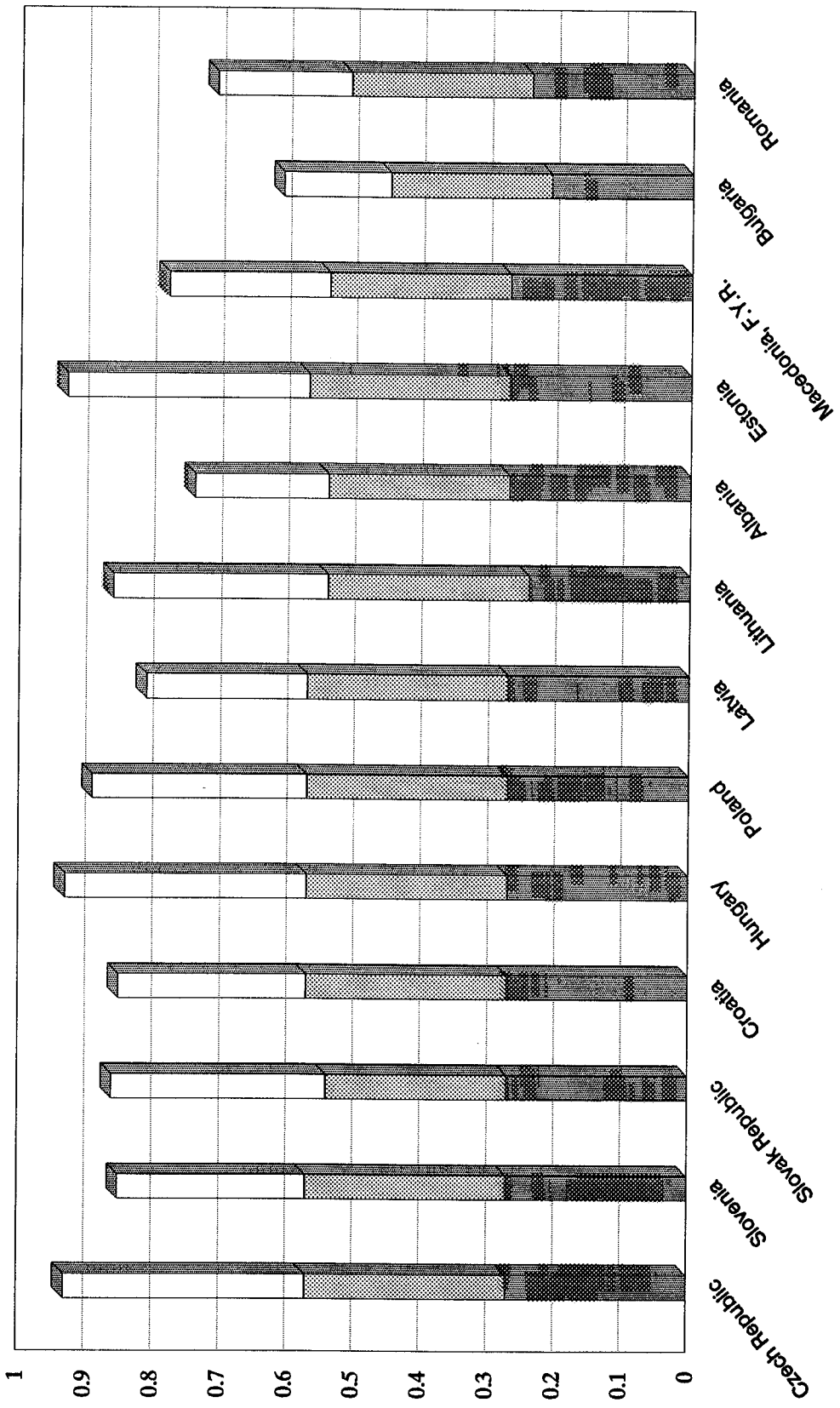


Table 4. Central and Eastern Europe:
Economic Liberalization Indices
(1995)

	Weighted Economic Liberalization Index (Weights)	Price Liberalization and Competition (.3)	Trade and Foreign Exchange Regime (.3)	Privatization and Banking Reform (.4)
Czech Republic	0.93	0.9	1.0	0.9
Slovenia	0.85	0.9	1.0	0.7
Slovak Republic	0.86	0.9	0.9	0.8
Croatia	0.85	0.9	1.0	0.7
Hungary	0.93	0.9	1.0	0.9
Poland	0.89	0.9	1.0	0.8
Latvia	0.81	0.9	1.0	0.6
Lithuania	0.86	0.8	1.0	0.8
Albania	0.74	0.9	0.9	0.5
Estonia	0.93	0.9	1.0	0.9
Macedonia, F.Y.R.	0.78	0.9	0.9	0.6
Bulgaria	0.61	0.7	0.8	0.4
Romania	0.71	0.8	0.9	0.5

Source: de Melo, Denizer, and Gelb (1995).

Table 5. Cross Correlations Among Different Measures of Economic Distance

European Union

	Per Capita Income	Fiscal Balance	Inflation	Distance
Per Capita Income	1.00			
Fiscal Balance	0.67	1.00		
Inflation	-0.65	-0.63	1.00	
Distance	-0.72	-0.63	0.66	1.00

Central and Eastern Europe

	Per Capita Income	Fiscal Balance	Inflation	Distance	Liberalization			
					Aggregate	Price	Trade	Bank
Per Capita Income	1.00							
Fiscal Balance	0.47	1.00						
Inflation	0.03	-0.16	1.00					
Distance	-0.62	-0.36	0.58	1.00				
Liberalization	0.56	0.33	-0.48	-0.66	1.00			
Price	0.17	0.19	-0.84	-0.52	0.72	1.00		
Trade	0.39	0.31	-0.42	-0.53	0.86	0.63	1.00	
Banking	0.64	0.33	-0.32	-0.63	0.97	0.55	0.75	1.00

Chart 5 combines the five indicators shown in Charts 1–4: distance, income per capita, inflation, the fiscal balance, and liberalization. The countries arranged from left to right on the horizontal axis according to distance of the capital from Brussels, that is, in the order in which they appear in Chart 1. There are then four indices for each country: from left to right, inflation, fiscal balance, per capita income, and liberalization. Each has been transformed onto a scale that runs from zero to one, with zero indicating a value farthest from Brussels, and one the closest.[11]

An overall impression given by Chart 5 is that economic distance from Brussels increases—on average—with geographical distance from Brussels. Another is that the CEE transition countries have done exceptionally well in keeping their budget deficits down.

We now create a rank order index which combines the performance in six categories (Table 6). The best-performing country in each category is ranked first in that category. For example, in Table 6 Croatia is ranked first in the category "annual inflation" since it had the lowest inflation rate in 1995. When an overall index is created by assigning equal weights to each category, the Czech Republic, the Slovak Republic, and Slovenia are the best performers, in that order. The laggards are Bulgaria, Romania, and Albania. Interestingly, Table 6 also suggests that, with the possible exception of Estonia, the distance from Brussels is, after all, a good predictor of economic distance.

VI. TIME FROM BRUSSELS

The measures presented so far are suggestive of the economic distance of CEE countries from Brussels. We now ask how long it would take the CEE countries to catch up with those of the EU. We can think of the growth process in the transition economies as being driven by two forces (see Fischer, Sahay, and Végh (1996b)): first, the transition process itself and, second—and increasingly so as stabilization and structural transformations are achieved—by the typical long-run growth process of a market economy.

---

[11]The income variable is 1995 per capita income divided by 10,000; the inflation index is (1/(1 + inflation)) in 1995; the fiscal index is 1 for countries with a deficit of less than 3 percent of GDP and otherwise (3/absolute value of the deficit), where the deficit is expressed as in Table 3; and the liberalization index is the overall index as in Chart 4.

Chart 5. Transition Economies: Central and Eastern Europe
Combined Indicators, 1995.

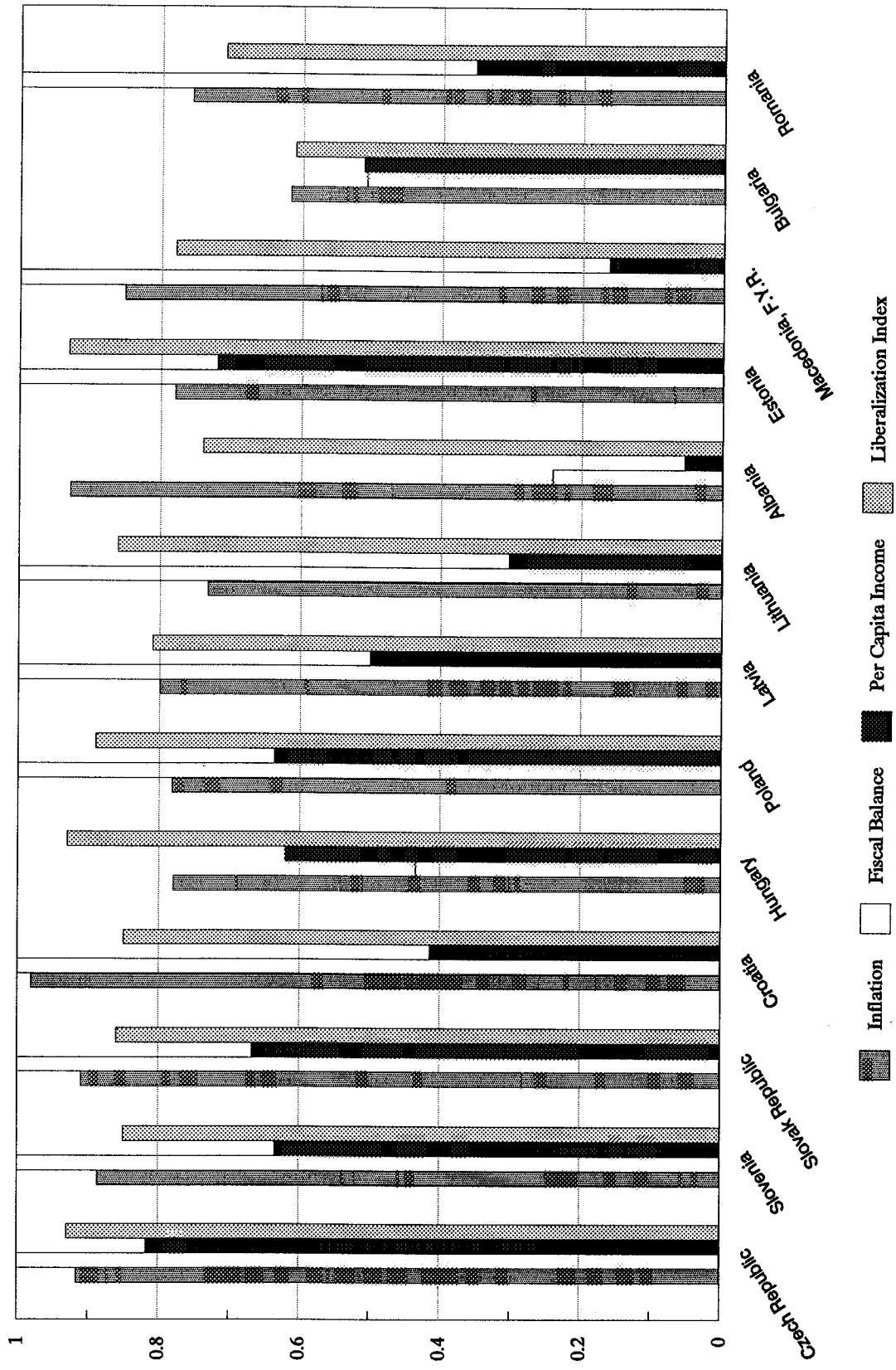


Table 6. Rank of CEE Countries by Selected Criteria 1/

	Distance from Brussels	Per Capita Income	Liberalization Index	Annual Inflation	Fiscal Balance	Public Debt (percent of GDP)	Overall Ranking 2/
Albania	9	13	11	2	13	11	11
Bulgaria	12	7	13	13	11	13	13
Croatia	4	9	7	1	6	8	5
Czech Republic	1	1	1	3	5	3	1
Estonia	10	2	1	10	7	1	4
Hungary	5	6	1	9	12	12	8
Latvia	7	8	9	7	4	4	6
Lithuania	8	11	5	12	10	2	9
Macedonia, FY	11	12	10	6	3	9	10
Poland	6	4	4	8	7	10	6
Romania	13	10	12	11	9	5	12
Slovak Republic	3	3	5	4	1	7	2
Slovenia	2	5	7	5	2	6	3

1/ The most favorably placed country ranked first.

2/ Overall ranking determined by assigning equal weights to each criterion.

In Fischer, Sahay, and Végh (1996a and 1996c), we have explored the determinants of transitional growth in some detail. We find, not surprisingly, that countries that have achieved macroeconomic stabilization and undertaken deeper reforms are growing faster during the transition. More precisely, the results show that a pegged exchange rate regime, tighter fiscal policy, and most measures of structural reform (as captured by various liberalization indices), have affected growth positively.[12]

These transitional growth results suggest that several of the variables presented earlier in the paper as measures of policy distance from Brussels also help predict how rapidly income levels will grow during the transition period. Gradually, as macroeconomic stability is assured and structural transformation completed, the determinants of growth of typical market economies should predominate. The remainder of this section is devoted to an exploration of long-term growth prospects in transition economies.

We draw on past cross-country studies of the determinants of growth to calculate implied growth rates for the CEE transition economies. Recent work on economic growth (see Barro and Sala-I-Martin (1995) for a survey of the literature) has focused on the concept of **conditional convergence**, that is, on whether, adjusting for differences in various policies and other economic characteristics, income in poorer countries is growing more rapidly than in richer countries. Given the structural relationships estimated in previous studies, we control for initial levels of state variables and predict rates of growth conditional on our expectation of the two control variables that we take to reflect government policy—investment rates and government consumption.

Table 7 presents information on some key state and control variables for the CEE economies.[13] We present data for the latest year available. Thus, population growth rates are for 1993 (source: World Bank); primary and secondary school ratios are mostly for 1993, otherwise one or two years before 1993 (sources: World Bank, and Krajnyak and Zettelmeyer (1996)); gross capital formation is for 1995 (source: IMF), exports and government consumption (in percent of GDP) for 1995 (source: IMF); and initial per capita income in U.S. dollars on a purchasing power parity basis is for 1995 (source: IMF).

---

[12]These results are based on regressions that include, in addition to CEE, the non-Baltic countries of the former Soviet Union and Mongolia.

[13]Not all the variables presented in Table 6 will be used in the subsequent regression-based simulations of growth rates. We include some (such as the inflation rate) because they have been significant in several empirical studies of growth, although they do not appear in the growth regressions used below.

Table 7. Factors Affecting Long-term Growth in Central and Eastern Europe

	Population Growth Rate (WB)	Primary School Enrollment (share of school age population) (WB)	Secondary School Enrollment (share of school age population) (WB,KZ)	Gross Capital Formation (share of GDP) in current prices (WEO, OECD)	Per Capita Income in US$ PPP based (IMF)	Exports of Goods and Services (share of GDP) in current prices (IMF)	Government Consumption Expenditure (share of GDP) in current prices (IMF)	Inflation in 1995 (period average) (IMF)
Albania	1.19	0.96	0.79	0.17	538	0.13	0.12	7.8
Bulgaria	-0.35	0.86	0.71	0.12	5132	0.50	0.17	62.1
Croatia	0.06	0.87	0.80	0.10	4142	0.41	0.30	2.0
Czech Republic	-0.06	0.99	0.89	0.31	8173	0.52	0.20	9.1
Estonia	-0.31	0.83	0.92	0.30	7203	0.68	0.21	28.3
Hungary	-0.53	0.94	0.81	0.23	6211	0.32	0.10	28.2
Latvia	-0.53	0.83	0.92	0.18	5002	0.41	0.20	25.1
Lithuania	0.15	0.92	0.92	0.19	3035	0.32	0.24	39.5
Macedonia, FYR	1.12	0.87	0.80	0.38	1628	0.45	0.14	17.4
Poland	0.20	0.98	0.83	0.16	6364	0.27	0.18	27.8
Romania	0.19	0.86	0.80	0.30	3542	0.28	0.14	32.0
Slovak Republic	0.35	1.01	0.96	0.22	6671	0.65	0.20	9.9
Slovenia	0.41	0.97	0.80	0.25	6342	0.54	0.20	12.8
Average	0.14	0.91	0.84	0.22	4922	0.42	0.18	23.2

Sources: International Monetary Fund (IMF), The World Bank (WB), Organisation for Economic Co-operation and Development (OECD), and Krajnyak and Zettlemeyer (KZ, 1996).

Given the data available for these countries, we predict future growth prospects using an equation of the form:

$$g(t) = f(Y_0, PS_0, SS_0; INV(t), GOV(t), POP(t)), \qquad (1)$$
$$\quad - \quad + \quad + \quad + \quad ? \quad -$$

where g(t) is per capita growth during the time interval t, Y_0 is the per capita income in the starting year, PS_0 is the primary school enrollment rate (in percent of the total primary school-aged population), SS_0 is the secondary school enrollment rate (in percent of the total secondary school-aged population), INV(t) is gross capital formation (in percent of GDP) during the time interval t, GOV(t) is government consumption expenditure (in percent of GDP) during the time interval t, and POP(t) is the growth rate of the population during the time interval t.

The predicted signs from neoclassical and endogenous growth models are presented below the explanatory variables in equation (1). Per capita growth, g(t), is negatively related to Y_0—this follows from the neoclassical convergence hypothesis that, *ceteris paribus*, poorer countries tend to grow faster than richer ones. The primary and secondary school enrollment ratios represent investment in human capital. Countries investing more in human capital tend to grow faster (see Romer (1990) and Grossman and Helpman (1991)). Higher physical investment ratios also increase the growth rate on the path to the steady state, and if sustained will also raise the steady-state level of output. The empirical literature is not conclusive regarding the effects of government consumption on growth (see Ram (1986) and Levine and Renelt (1992) for contrasting results). The impact on growth should depend on the type of government spending, as well as on the distortions associated with its financing.

The neoclassical growth model implies that for a given saving rate, per capita income growth is reduced by population growth. Some models with endogenous population growth imply a further negative impact of population growth on per capita income growth because higher population growth rates imply that a larger amount of time is spent in raising children than in other productive activities.

As Table 7 indicates, initial income levels in the CEE transition countries are relatively low. On this basis, one should expect these countries to grow faster than western Europe in the future. The most impressive features in Table 7 are the extremely high primary and secondary school enrollment ratios in the CEE countries (especially relative to other developing countries). The basic literacy that is ensured by these ratios is an important requirement for growth. Despite the high level of basic education attained in most of the CEE economies, it is

likely that further human capital investment will be required to provide retraining in market-based institutions, build entrepreneurial skills, and ensure technological innovation and adaptation.[14]

Gross capital formation in the CEE transition countries amounted to an average of 22 percent of GDP in 1995, with wide variation across countries. In contrast, the fast-growing market economies in Asia typically have an investment ratio of at least 30 percent of GDP. Government consumption in most countries declined sharply from 50–60 percent at the start of the transformation process, to an average level of 18 percent of GDP in 1995.[15] While government consumption at the previous rates was not sustainable and must have reduced growth, it is becoming increasingly clear that sharp reductions in expenditures on the scale seen in some of the transition economies may be adversely affecting reform and growth. Rapid revenue declines and the need to reduce budget deficits for various reasons (see Cheasty and Davis (1996) and Haque and Sahay (1996)) have often led to tax evasion, involuntary expenditure compression, sequestration, and a build-up of arrears.[16] Indeed, it is likely that growth would be enhanced by well-planned public spending on building market-based institutions, improving the quality of government administration, improving physical infrastructure and setting up a social safety net.[17]

Population growth rates in the CEE economies are low, and in many cases negative. As the extensive state support system for dependents, particularly children, is reduced, we could expect a further decline in population growth rates. It is likely though that population growth rates will recover once the economic prospects in these economies become less uncertain.

---

[14]Despite consistently high human capital indicators, Easterly and Fischer (1994) show that a leading cause of economic decline in the former Soviet Union was the low elasticity of substitution between capital and labor, which they argue was, in part, explained by lack of entrepreneurial skills and the slow adaptation to imported technological progress.

[15]We have to repeat the standard warning on data: data on gross capital formation as well as on government consumption are subject to a wide margin of error, primarily because the demand-based UN system of national income accounting is still at an early stage in most of the countries included in Table 7.

[16]In noting this point, we do not mean to imply that larger budget deficits would be desirable, but rather that both revenue collection and the quality of public expenditures need to be improved in these countries.

[17]Keefer and Knack (1995) present empirical evidence from cross-country growth regressions that point to the positive impact on growth of better institutions.

Table 8 provides preliminary insights on the growth potential in CEE transition economies by comparing key determinants of growth with past averages for slow and fast-growing countries. Human capital indicators are extremely favorable and so is the degree of openness. The inflation rate in 1995 was still quite high, but is declining rapidly.[18]

To project long-term growth in the CEE transition economies, we use the equations estimated by Barro (1991) and Levine and Renelt (1992):[19]

Barro growth equation:

$$\text{per capita growth} = 0.0302^* - 0.0075^* Y_{1960} + 0.025^* \text{PRIM} + 0.0305^* \text{SEC} - 0.119^* \text{GOV} \quad (2);$$

Levine and Renelt growth equation:

$$\text{per capita growth} = -0.83 - 0.35^* Y_{1960} - 0.38\ \text{POP} + 3.17^* \text{SEC} + 17.5^* \text{INV} \quad (3)$$

Here Y_{1960} is the initial level of real per capita income on a PPP basis (expressed in logs in the Barro equation and divided by a 1000 in the Levine-Renelt equation), POP is the growth rate of population, PRIM is the gross primary school enrollment rate, SEC is the gross secondary school enrollment rate, GOV is the share of government consumption expenditure in GDP, and INV is the share of investment in GDP. (The stars next to the estimated coefficients indicate that they are significant at least at the 5 percent level.)

It is imperative to caution the reader about several qualifications that apply to the growth predictions below. There is a plethora of estimated growth equations available in the literature, of which we use only two. Moreover, the values of the estimated coefficients are sensitive to model specification, the countries selected, and the sample period. Thus, our projections could differ in significant ways were we to apply other studies. These projections have also abstracted from some potentially important external, political, and institutional factors. While such factors are hard to assess quantitatively (even in the existing growth literature), they could exert considerable influence on the growth process.

---

[18]See Fischer (1993) for evidence that inflation is negatively associated with growth.

[19]We chose these equations both because they are widely quoted and because it was relatively straightforward to obtain data for the CEE transition economies matching the right-hand side variables in the Barro (1991) and Levine and Renelt (1992) regressions.

Table 8. Central and Eastern Europe in a Global Perspective

	Fast-growers	Slow-growers	Central and Eastern Europe in 1995 1/
Primary-school enrollment rate (in 1960)	0.90	0.54	0.91
Secondary-school enrollment rate (in 1960)	0.30	0.10	0.84
Share of investment in GDP (during 1960-89)	0.23	0.17	0.22
Government consumption/GDP (during 1960-89)	0.16	0.12	0.18
Share of exports to GDP (during 1960-89)	0.32	0.23	0.42
Annual inflation rate (during 1960-89)	12.3	31.1	23.2

Source: Levine and Renelt (1992) and Table 7.
1/ Average for 13 CEE countries.

For all variables in equations (1) and (2)—with the exception of investment and government consumption—we use the figures presented in Table 7. For the control variables, we assume the same investment and government consumption ratios (in percent of GDP) across all countries because, as Table 7 indicates, these figures exhibit a wide range of variation (and some even seem unrealistic) at the present time. Moreover, using current figures for investment and government consumption to project growth would be equivalent to assuming that current policies will not only differ very widely across countries but also not change in the future. Hence, for the purposes of our exercise, it makes more sense to assume that all countries follow the same policies, those that constitute a "good" policy scenario. Hence, we assumed a high investment ratio (30 percent of GDP) and a low level of government consumption (10 percent of GDP).

Not surprisingly, the more optimistic scenario is obtained by using Barro's equation (Table 9), which gives a relatively high weight to the human capital variables. The projected average per capita growth rate for the region is 5.6 percent, with all countries falling in the 4.9–7.1 percent range. In the calculations based on the Levine and Renelt equation (Table 10), the average per capita growth rate declines to 5.3 percent, with all countries falling in the 6.3–4.4 percent range. Chart 6 illustrates the projected rates of growth of the transition economies obtained under the two different specifications.

Based on initial per capita income and the projected per capita growth rates for the CEE countries, we computed the number of years it would take for each of these countries to converge to the average per capita GDP level in the low income European Union countries (Greece, Portugal, and Spain). As indicated in Table 11, the average per capita GDP for these three European countries ($11,690) is more than twice the average for the CEE ($4,922). These three European countries are assumed to grow—in per capita terms—at 2 percent per year. According to both equations, it would take, on average, about one generation to converge to the per capita level of the low-income European Union countries: the Barro equation predicts 28 years, while the alternative Levine-Renelt predicts 31 years. Among the Eastern European countries, the Czech Republic, the Slovak Republic, and Estonia are projected to take the shortest time to converge.

VII. DRIFTING AWAY FROM BRUSSELS

So far, we have asked how long it may take for CEE countries to converge to the per capita GDP level of the low-income European Union countries (i.e., how long it will take to "reach" Brussels). We now ask a different question: how badly did more than 40 years of socialism hurt growth in the CEE countries? In other words, by how much did CEE countries "drift away" from Brussels during that period?

Table 9. Projecting Long-Term Trend Growth based on Barro Regression

	Population Growth Rate (WB)	Primary School Enrollment (share of school age population) (WB)	Secondary School Enrollment (share of school age population) (WB,KZ)	Per Capita Income in US$ PPP based (IMF)	Government Consumption Expenditure (share of GDP)	Projected Per Capita Growth Rate	Projected Growth Rate
Albania	1.19	0.96	0.79	538	0.10	7.10	8.29
Bulgaria	-0.35	0.86	0.71	5132	0.10	4.92	4.56
Croatia	0.06	0.87	0.80	4142	0.10	5.38	5.44
Czech Republic	-0.06	0.99	0.89	8173	0.10	5.44	5.39
Estonia	-0.31	0.83	0.92	7203	0.10	5.23	4.92
Hungary	-0.53	0.94	0.81	6211	0.10	5.28	4.75
Latvia	-0.53	0.83	0.92	5002	0.10	5.50	4.98
Lithuania	0.15	0.92	0.92	3035	0.10	6.10	6.25
Macedonia, FYR	1.12	0.87	0.80	1628	0.10	6.08	7.19
Poland	0.20	0.98	0.83	6364	0.10	5.42	5.62
Romania	0.19	0.86	0.80	3542	0.10	5.47	5.66
Slovak Republic	0.35	1.01	0.96	6671	0.10	5.86	6.21
Slovenia	0.41	0.97	0.80	6342	0.10	5.31	5.72
Averages	0.14	0.91	0.84	4922	0.10	5.62	5.77

Sources: International Monetary Fund (IMF), The World Bank (WB), Organisation for Economic Co-operation and Development , (OECD) and Krajnyak and Zettelmeyer (KZ,1996).

Table 10. Projecting Long-Term Trend Growth based on Levine-Renelt Regression

	Population Growth Rate (WB)	Secondary School Enrollment (share of school age population) (WB,KZ)	Gross Capital Formation (share of GDP) in current prices (OECD, WEO)	Per Capita Income in US$ PPP based (IMF)	Projected Per Capita Growth Rate	Projected Growth Rate
Albania	1.19	0.79	0.30	538	6.28	7.47
Bulgaria	-0.35	0.71	0.30	5132	5.01	4.65
Croatia	0.06	0.80	0.30	4142	5.48	5.55
Czech Republic	-0.06	0.89	0.30	8173	4.40	4.34
Estonia	-0.31	0.92	0.30	7203	4.93	4.62
Hungary	-0.53	0.81	0.30	6211	5.02	4.49
Latvia	-0.53	0.92	0.30	5002	5.79	5.26
Lithuania	0.15	0.92	0.30	3035	6.22	6.37
Macedonia, FYR	1.12	0.80	0.30	1628	5.96	7.08
Poland	0.20	0.83	0.30	6364	4.75	4.95
Romania	0.19	0.80	0.30	3542	5.64	5.84
Slovak Republic	0.35	0.96	0.30	6671	5.00	5.34
Slovenia	0.41	0.80	0.30	6342	4.58	4.99
Average	0.14	0.84	0.30	4922	5.31	5.46

Sources: International Monetary Fund (IMF), The World Bank (WB), Organisation for Economic Co-operation and Development (OECD), and Krajnyak and Zettelmeyer (KZ,1996).

Chart 6. Central and Eastern Europe
Projected Per Capita Growth

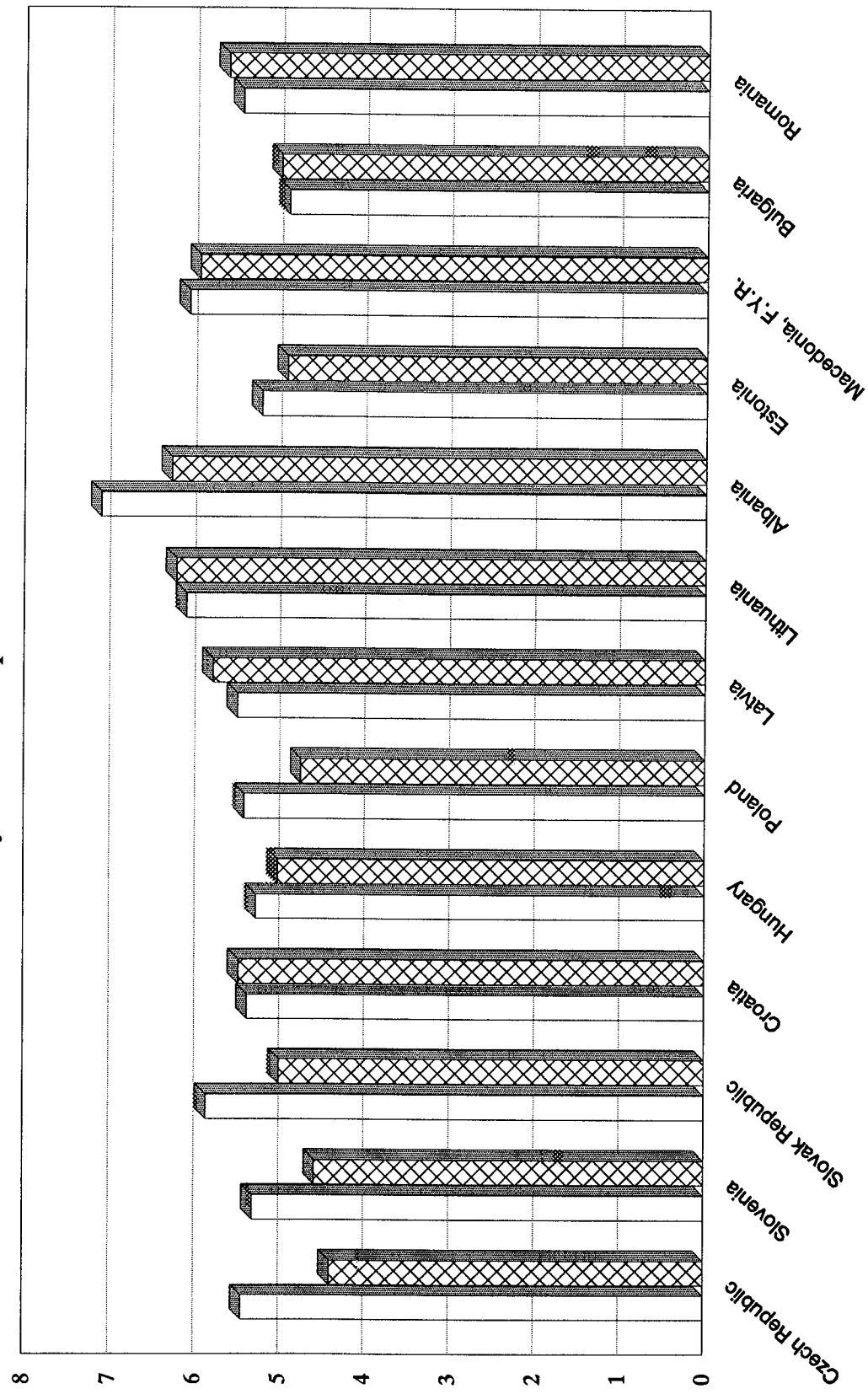


Table 11. Policy Simulations for GDP Convergence to Low-Income EU Countries 1/

	Per Capita Income in US$ PPP based (IMF)	Barro		Levine-Renelt	
		Government consumption = 10 percent (in percent of GDP)		Investment = 30 percent (in percent of GDP)	
		Projected Per Capita Growth	Number of years to converge to low-income EU levels	Projected Per Capita Growth	Number of years to converge to low-income EU levels
Albania	538	7.10	63	6.28	75
Bulgaria	5132	4.92	29	5.01	28
Croatia	4142	5.38	32	5.48	31
Czech Republic	8173	5.44	11	4.40	15
Estonia	7203	5.23	16	4.93	17
Hungary	6211	5.28	20	5.02	22
Latvia	5002	5.50	25	5.79	23
Lithuania	3035	6.10	34	6.22	33
Macedonia, FYR	1628	6.08	50	5.96	52
Poland	6364	5.42	18	4.75	23
Romania	3542	5.47	36	5.64	34
Slovak Republic	6671	5.86	15	5.00	19
Slovenia	6342	5.31	19	4.58	24
Average for transition	4922	5.62	28	5.31	31
Average for low-income European Union countries 1/	11690	2.00		2.00	

1/ For illustrative purposes, average of the three lowest income countries in the European Union (Greece, Portugal, and Spain) are considered. These countries are assumed to grow at 2 percent per annum.

Due to lack of data, we will try to answer this question only for the six CEE countries indicated in Table 12. To provide an answer, we proceed in three stages. We first take the 12 core western European countries (the first 12 countries listed in Table 2), and estimate the absolute convergence coefficient (defined below) for the period 1937–1992. We then use this estimate of the convergence coefficient, together with the initial per capita GDP of the CEE countries (column (1) in Table 12), to compute what the level of per capita GDP in these CEE countries **would have been** in the 1990s had they followed the general convergence pattern of western Europe. Finally, we use the projected long-term growth rates for the CEE countries from Tables (9) and (10) to calculate how long it would take to make up for the lost years under socialism.

Based on Barro and Sala-I-Martin (1992), we first estimate the following equation using a nonlinear least squares procedure:

$$\ln(y_{i,T}/y_{i,0}) = C - (1-e^{-\beta T})\ln(y_{i,0}) + \epsilon_i, \qquad (4)$$

where y is GDP per capita, I indexes the countries, T is the length of the period (55 years in this case), β is the convergence coefficient, ϵ is an independent error term, and C is the constant term (which is common across countries). The estimated β coefficient for the 12 western European countries is 0.029, which is significant at the 5 percent level. This implies that these countries were converging at an average rate of about 3 percent per year during this period; that is, about 3 percent of the income gap between the richer and poorer countries was closed every year.[20]

---

[20]Barro and Sala-I-Martin (1991) find that the rate of convergence for 73 regions across 7 west European countries during 1950-1985 was about 2 percent per year. In our sample, if we add the 4 southern European countries (Greece, Portugal, Spain, and Turkey) to the core 12 western European countries, the rate of convergence slows down considerably to about 0.5 percent per year. This fall in the rate of convergence may be indicating that the beta coefficient is biased when the southern European countries, which have remained relatively poor, are included in the sample, perhaps because the latter group was converging to a lower steady-state income level. This could be tested by controlling for other variables that affect the steady-state—i.e., by testing for conditional convergence—which lies beyond the scope of this paper.

Table 12. Estimating Income Lost During the Socialist Period

	GDP per capita			GDP per capita "lost" during socialism	Projected future growth (Barro) 2/	Number of years required to make-up	Projected future growth (Levine-Renelt) 2/	Number of years required to make-up
	1937 (1)	1992 (actual) (2)	1992 (predicted) 1/ (3)	(3) minus (2)				
Bulgaria	1566	4054	14000	9946	4.92	26	5.01	25
Czechoslovakia	2882	6845	15845	9000	5.65	15	4.70	18
Hungary	2543	5638	15448	9810	5.28	20	5.02	21
Poland	1915	4726	14584	9858	5.42	21	4.75	24
Romania	1130	2565	13102	10537	5.47	31	5.64	30
Yugoslavia	1284	3887	13446	9559	5.59	23	5.34	24
Average	1887	4619	14404	9785	5.39	23	5.08	24

Sources: Table 2, Table 9, and Table 10.

1/ Predictions based on authors' regressions (see text).

2/ Czechoslovakia's growth rate is average of those of the Czech Republic and the Slovak Republic, while Yugoslavia's is average of those of Croatia, Slovenia, and FYR Macedonia.

On the basis of the estimated β coefficient for the control group (the 12 western European countries) and the initial (1937) per capita GDP of the 6 CEE countries, we predict the per capita GDP in the terminal period (1992) for the 6 countries. These predicted values are indicated in column (3) of Table 12. The gap between the predicted value and the actual value in 1992 is interpreted as the "loss" attributable to the socialist experiment.[21]

Finally, we compute the number of years it would take to make up for such a loss. As shown in Table 12, it would take on average 23–24 years to make up for the lost time, ranging from 15–18 years for the former Czechoslovakian republics to about 30 years for Romania. In other words, the cost of the socialist experiment—which lasted roughly two generations—was, in terms of lost income, equivalent to about one generation.

VIII. CONCLUDING COMMENTS

Six years into the transition from socialism to a market economy, there is sufficient preliminary evidence to discuss the question: how far is Central and Eastern Europe from Brussels? We presented different measures of distance; ranging from physical distance (which, after all, turns out not to be a bad proxy for economic distance) to time distance (in terms of years needed to catch up with EU income levels). One overall conclusion is that the richest CEE countries are not that far away from Brussels; for example, it could take the Czech Republic only about 15 years to catch up with the low-income western European countries. Naturally, the catching-up time is directly related to the time squandered during the socialist experiment. We estimate that, on average, the CEE countries gave away about one generation worth of income during the 40 or more years of socialism.

Of course, the length of time it will take any given CEE country to reach Brussels is not predetermined. Our estimates of how long it will take CEE to reach Brussels were based on the best-case scenario that policies that promote investment and improve the quality of public spending are in place. Many of the transition economies in Central and Eastern Europe have moved rapidly on several of the necessary fronts, particularly in liberalizing the price, foreign exchange and trade regimes. However, many of the market-based institutions have still some distance to go before reaching western European standards. In most economies, privatization of state enterprises is still far from complete and the banking system is under severe strain. While not all transition economies are equally well placed, the starting conditions are favorable in most countries. The right policies will ensure a safe trip to Brussels.

---

[21]It can be argued that the CEE countries were different from the 12 core western European countries in 1937 and, therefore, would not have converged to the same steady-state. However, the hypothesis of absolute convergence appears to make sense for at least Czechoslovakia, Hungary, and Poland, which shared a common historical background and economic structures with western Europe and were also physically close to Brussels. The answer is less obvious for the other three CEE countries listed in Tables 2 and 12.

REFERENCES

Barro, Robert J., 1991, "Economic Growth in a Cross-Section of Countries," *Quarterly Journal of Economics,* Vol. 106, pp. 407–443.

Barro, Robert J. and Xavier Sala-I-Martin, 1991,"Convergence Across States and Regions," *Brookings Papers on Economic Activity*: 1, The Brookings Institution, pp. 107–58.

Barro, Robert J. and Xavier Sala-I-Martin, 1992, "Convergence," *Journal of Political Economy,* Vol. 100, pp. 223–51.

Barro, Robert J. and Xavier Sala-I-Martin, 1995, *Economic Growth*, (United States: McGraw-Hill, Inc.).

Cheasty, Adrienne, and Jeffrey Davis, 1996, "Fiscal Transition in Countries of the Former Soviet Union: An Interim Assessment," IMF Working Paper 96/61 (Washington: International Monetary Fund).

De Melo, Martha, Cevdet Denizer, and Alan Gelb, 1995, "From Plan to Market: Patterns of Transition," unpublished (Washington: The World Bank).

Easterly, William, and Stanley Fischer, March 1994, "The Soviet Economic Decline: Historical and Republican Data," unpublished (Washington: The World Bank).

European Bank for Reconstruction and Development, October 1994, *Transition Report* (London: EBRD).

European Bank for Reconstruction and Development, April 1995, *Transition Report Update* (London: EBRD).

Fischer, Stanley, 1993, "The Role of Macroeconomic Factors in Growth," *Journal of Monetary Economics,* Vol. 32, pp. 485–512.

Fischer, Stanley, Ratna Sahay, and Carlos A. Végh, 1996a, "Stabilization and Growth in Transition Economies: The Early Experience", *Journal of Economic Perspectives,* Vol. 10, pp. 45–66.

Fischer, Stanley, Ratna Sahay, and Carlos A. Végh, 1996b, "Economies in Transition: The Beginnings of Growth", *American Economic Review,* Papers and Proceedings, Vol. 86, pp. 229–233.

Fischer, Stanley, Ratna Sahay, and Carlos A. Végh, 1996c, "From Transition to Market: Evidence and Growth Prospects," unpublished (Washington: International Monetary Fund).

Giersch, Herbert, 1979, "Aspects of Growth, Structural Change, and Employment—a Schumpeterian Perspective," *Weltwirtschaftliches Archiv,* Vol. 115, pp. 629–652.

Gros, Daniel and Alfred Steinherr, 1995, *Winds of Change* (London and New York: Longman).

Grossman, Gene M., and Elhanan Helpman, 1991, *Innovation and Growth in the Global Economy* (Cambridge, MA: MIT Press).

Haque, Nadeem U., and Ratna Sahay, 1996, "Do Government Wage Cuts Close Budget Deficits? An Analytical Framework for Developing Countries and Transition Economies," IMF Working Paper 96/19 (Washington: International Monetary Fund).

International Monetary Fund, May 1996, *World Economic Outlook* (Washington: International Monetary Fund).

Keefer, Philip and Stephen Knack, 1995, "Why Don't Poor Countries Catch Up? A Cross-National Test of an Institutional Explanation," IRIS Working Paper (College Park, MD: University of Maryland).

Krajnyak, Kornelia and Jeromin Zettelmeyer, 1996, "Competitiveness in Transition Economies," unpublished (Washington: International Monetary Fund).

Levine, Ross and David Renelt, 1992, "A Sensitivity Analysis of Cross-Country Growth Regressions," *American Economic Review*, Vol. 82, pp. 942–63.

Murrell, Peter, 1996, "How Far Has the Transition Progressed?" *Journal of Economic Perspectives,* Vol. 10, pp. 25–44.

Ram, Rati, 1986, "Wagner's Hypothesis in Time Series and Cross-Section Perspectives: Evidence from 'Real' Data for 155 Countries," *Review of Economics and Statistics*, pp. 194–204.

Romer, Paul M., 1990, "Endogenous Technological Change," *Journal of Political Economy,* Vol. 98, Part II, S71–S102.

Sachs, Jeffrey and Andrew Warner, 1995, "Economic Reform and the Process of Global Economic Integration," *Brookings Papers on Economic Activity*, No. 1, pp. 1–95.