

## **EMU Convergence Prospects and Transition Countries**

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### **ABSTRACT**

The new members of the European Union (EC8) in 2004 could not have imagined the possibility of joining the EU thirty years ago. The next goal of the EC8 is to achieve European Monetary Union (EMU) convergence in the foreseeable future. This paper looks at the progress achieved by the EC8 to accede to the European Union (EU) and the reforms, strategies and convergence goals necessary to achieve EMU membership. Using synthetic taxonomic analysis, this paper looks at which transition countries are on track to achieve EMU convergence now that EU membership is attained, and for other accession countries. Our empirical study finds that most of the EC8 countries are on track to achieve EMU membership but post-facto membership does not guarantee the maintenance of market restructuring.

*JEL Classification: P34, F33, F36*

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## I. INTRODUCTION

The successful accession by the ten new members into the European Union on May 1, 2004 was welcome news. The progress made by the eight former Central Eastern bloc countries (EC8), the Czech Republic, Lithuania, Latvia, Slovakia, Slovenia, Hungary, Estonia and Poland, in transitioning from a planned economy to a market economy in just over a decade and a half is remarkable. This success is seen in three crucial areas necessary to support a changing market-based economy: the financial sector, which is still primarily bank-based, the enterprise real sector, and the legal system. Although different countries progressed at different degrees, notably, with Poland, Hungary and the Czech Republic pulling ahead of the group, nonetheless, in retrospect, all have transitioned sufficiently to achieve EU membership. The membership is not without socio-economic costs to the countries, but the prospects of a higher standard of living and an economic-political union with old Europe is desirable. A smooth and full compatibility with the European Union is still a work in progress.

Sweeping and sometimes painful reforms in the three crucial areas were made initially, followed by a slowing down of reforms in some areas (enterprise) and sometimes backtracking in others (legal). Overall, the EC8 were able to maintain economic stability and growth. Real GDP growth for most of the EC8 climbed from negative numbers to as high as 7.9 percent for Latvia in 2001. The challenge facing the EC8, despite the EU membership, is the continued focus on enterprise restructuring and corporate governance, banking and financial sector restructuring and regulation, legal consistency and enforcement, and fiscal and social sector reforms to achieve EMU convergence. The EMU convergence requires that the EC8 are able to meet the Maastricht criteria of monetary and fiscal stability in budget management and responsibility, not only within their own country but also in tandem with old Europe. The attainment of EMU membership will be the ultimate economic and monetary union, which will confer on the EC8 a full and equal status with old Europe.

## II. LITERATURE REVIEW

A survey of literature on transitional economies that focused on the three crucial areas of financial, enterprise, and legal sectors reforms are numerous. A number of theoretical studies presented linkages between an efficient financial market, the quality of investments and an accelerated economic growth. Studies on EU enlargement and monetary convergence primarily focused on currency regime policies, structural reforms, and possible shocks from an enlarged EU.

De Grauwe and Schnable (2004a) find that full integration into the EMU is expected to bring prosperity, political stability, and integration into the global arena. Specifically, the expected benefits of membership are welfare gains, macroeconomic stability, increased trade, and lower interest rates. Font and Batalla (1998), in a study about EU enlargement, conclude that although great strides have been made in economic compatibility with the EU in terms of trade, there are still "enormous differences that make unrealistic an economic integration in the short run". On the other hand, they conclude that based on their EMU stability indicators EU enlargement is feasible.

Most transition studies on financial restructuring focused on the impact of financial reforms on economic growth. The performance of the financial sector is important to the healthy functioning of the overall economy (Koivu, 2002; Levine, 2002). Levine finds that the enforcement of legal rights and an efficient legal system in financial development contributes to long-run economic growth. An efficient financial structure is also required to mobilize domestic and foreign savings to investment opportunities (Bencivenga and Smith, 1991). An empirical study by King and Levine (1993) finds that there is a strong positive relation of the financial development variables: liquid liabilities relative to GDP, allocation of credit by commercial bank relative to the central bank, allocation of credit to private enterprises relative to total domestic credit, and credit to the private sector relative to GDP, on economic growth. However, Demetriades and Hussein (1996) find that, of the countries under study, half of the countries have a two-way causality between financial development and economic growth while the rest of the countries have a one-way causality from economic growth to financial development. Levine, Loayza and Beck (2000) find that there is a strong positive causality of the banking sector on economic growth. Greenwood and Jovanovic (1990) find that the attraction of profitable returns on capital promotes economic growth, which in turn spurs financial restructuring. Another study finds a vicious cycle between poor financial development and low economic growth (Blackburn and Hung 1996). Harrison, Sussman and Zeira (1999) argue that increased economic growth leads to increased banking activities and profit and attracts entry of new banks. A study on bank performance finds that although bank efficiency improves with recapitalization of big banks, privatization of the banking sector to private ownership, other than to foreign owners, has no statistically significant improvements on bank efficiency (Grigorian and Manole 2002). The authors suggest that further study is needed to see if efficiency gains from foreign ownership are due to management skills or technology transfer. Given the strong theoretical and empirical evidences of linkage between financial sector development and economic growth, it is vital for the transition countries to achieve an effective and efficient financial system.

Studies on enterprise restructuring by transitional economies looked at the difficulties and the socio-economic cost of enterprise restructuring. Bebchuk and Roe (1999) develop a path dependent theory and argue that corporate structures inherited from the past have important influence on the path of future restructuring, and that despite convergence pressures differences will persist due to entrenched interest groups resisting change or determining the diverging paths. Foo and Michelson (2003) find that privatization of the state-owned enterprise sector contributed significantly to economic growth for countries like Russia, Poland, and Hungary, by attracting external capital injection. However, the study also indicates that a strong corporate governance oversight, supported and enforced by competent legal institutions, is needed. The enterprise restructuring met with some measures of success in some of the transitional countries, but many experienced difficulties in eliminating soft budgets, inefficiencies, corruption, and unclear protection of property rights, undermining domestic and foreign investors' confidence. However, private ownerships tend to exhibit superior performance than state ownership (Kocenda and Svejnar (2002).

Studies on legal system restructuring in transitional economies found that laws are relatively easy to enact, but timely and effective enforcement is problematic. Easterbrook and Fischel (1991) and Ramseyer (1998) argue that legal obstacles impede

convergence, which will take place once the obstacles are eliminated. Pistor, Raiser and Gelfer's (2000) study on corporate governance finds that despite stronger legislation to improve stockholders and creditors' rights it has not improved external financing, although it has improved the development of the credit market. On the other hand, they find that the existence of legal institutions has been more effective in improving external financing, from both debt and equity. The implication is that effective enforcement of the laws is more important than the laws on the book itself. Pistor et al conclude that the lack of effective legal institutions have impeded the development of the financial markets in the transition countries.

A few studies looked at EMU convergence factors of the Central European countries. Kozluk (2003) enumerates the various convergence factors, such as business cycles, prices, openness, and fiscal and monetary policies, that have to be synchronized and harmonized. Using fuzzy clustering algorithm and principal component analysis, Kozluk finds that the Central Eastern European countries (CEECs) show strong convergence towards the eurozone, and that the Czech Republic, Slovakia, and Estonia are the most qualified five years prior to membership while Hungary, Slovenia, and Poland will have to progress further to meet entry conditions. Lithuania and Latvia will also have no difficulties to qualify for EMU membership. Convergence factors can also be gathered from various theories on Optimum Currency Area proposed by Mundell (1961), McKinnon (1963), Tavlas (1993), and Lavrac and Zumer (2003). A criticism of measuring currency integration put forth by Frankel and Rose (1998) argues that ex-ante historical indicators are not reliable predictors of future membership qualification, given that convergence factors are highly endogenous.

De Grauwe and Schnabl (2004b) explore real and nominal monetary convergence to the EMU for the new EU members, placing particular emphasis on inflationary currency appreciation as an entry barrier. They conclude that systematic upward pressure on inflation will jeopardize some of the EC8s' accession for EMU membership, thereby requiring tighter budgetary policies. According to the criteria, the best performing countries are Poland, the Czech Republic, and Lithuania.

The "virtuous cycle" of EU membership and EMU accession attracts FDI inflows which in turn spur further efforts in transition reforms, thereby enhancing country development (Bevan and Estrin, 2000). Foreign participation and ownerships can also significantly expand the transitional countries' global presence (Bornstein, 2000). The convergence studies, with the exception of De Gauwe and Schnabl (2004b), were done before the EU8 achieved EU membership. Now that EU membership is a fact, the next hurdle for the EU8 is to strive for EMU membership. The importance and benefits of maintaining transition reforms in all three areas to qualify for EMU membership are clear from the literature. A question, which this paper seeks to answer, is whether the EU8 and other accession countries are on track to meet the EMU requirements.

### III. TRANSITION PERFORMANCE

Transforming the enterprise sector, the banking and financial sector, and the legal system into a competitive, open market economy is challenging and unprecedented. Since the initiation of reforms in the early 1990s, the EC8 have achieved remarkable

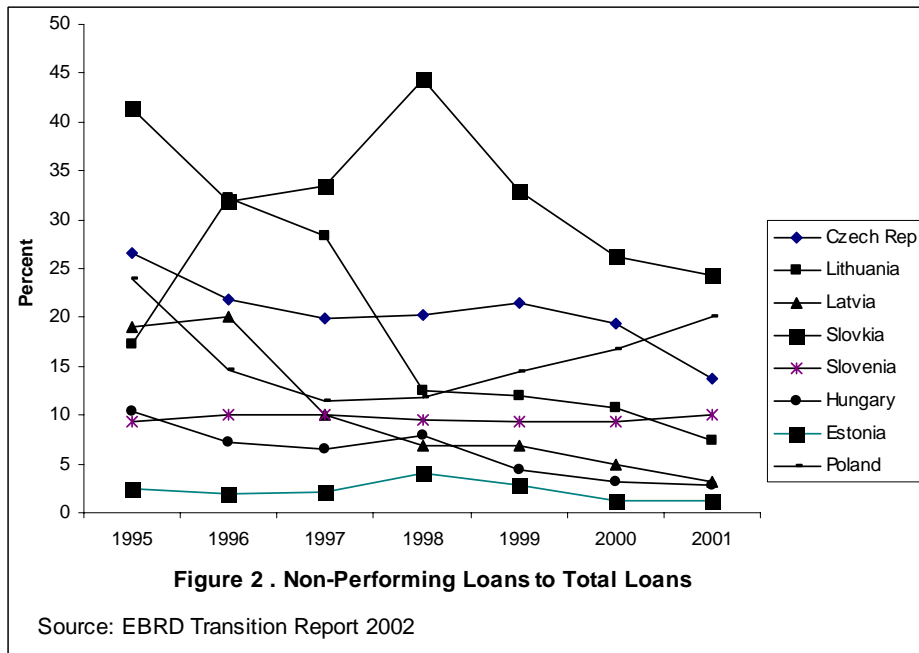
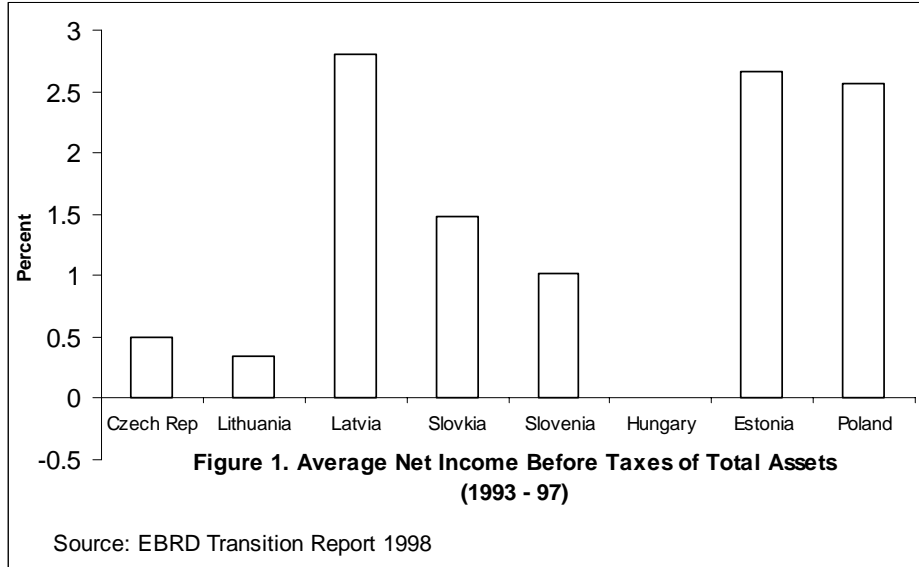
progress in the three crucial areas. However, extensiveness in reforms is not the same as effectiveness.

In the financial sector, inefficiencies constrain economic growth and entrepreneurship by undermining investor confidence and domestic entrepreneurship. When compared with old Europe, the banking system remains relatively underdeveloped, particularly in channeling credit to the private enterprise sector. The securities market is even less developed providing miniscule, if any, financing to the private and public sector. The inherited mono-banking system from the planned economy is still evident in its lack of depth and width of the primarily banking-based financial system in the EC8. The deficiencies in supervision and regulation tend to increase the EC8s' vulnerability to financial crisis. The insufficient transparency and corporate governance in the financial institutions, making it difficult for financial regulations to be enforced effectively, exacerbate this.

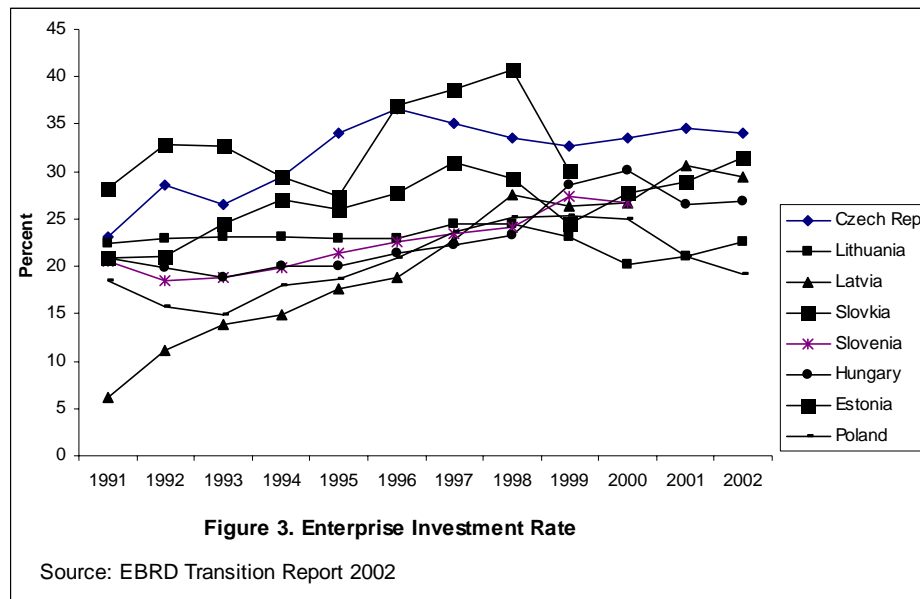
Foo (2005) finds that the Central Eastern European countries (CEECs) progressed further in their transitional efforts in banking reforms than the Commonwealth of Independent States (CIS). In particular, the Czech Republic, Hungary, and Poland, in their efforts to comply with EU accession requirements, made remarkable progress but at the expense of macro-instability from high budget deficits and vulnerability to external shocks from closer ties to the EU zone. However, all transitional countries were better off in implementing reform efforts.

The lesson from transitional banking is that economic growth can be destabilized by a weak financial system. The systemic banking problems faced by the transitional countries are inadequate accounting standards and transparency, protection for stockholders, prudential regulations, and inadequate deposit insurance. Supervisory and regulatory policies, independent from interest groups and corruption, have to keep pace as the financial sector evolves and grows in complexity in order to support a growing enterprise real sector. The evolution of the financial system has been greatly helped by inviting foreign banks participation, bringing skilled management, modern information technology, and a corporate governance system to ensure management accountability and responsibility. For example, foreign banks ownership in Poland increased from 1.23 percent in 1995 to 76.27 percent in 2002. The financial reforms enabled the EC8 to integrate into the EU and international financial markets. As a result, capital flows and investment activity have increased significantly, boosting and sustaining GDP growth. Figures 1 and 2 show the performance of the EC8 banks. Average net income-before-taxes to total assets for the EC8 countries is positive except for Hungary (zero). For the period 1993-97, average net income-before-taxes to total assets for Latvia was as high as 2.8 percent. Non-performing loans are also decreasing for most of the EC8 countries.

Enterprise restructuring in transitional economies has undergone tremendous changes. Privatization of the enterprise sector was the initial mantra for a successful transition to a market economy. A successful restructured enterprise sector is not only a question of state versus private ownership, but also the corporate structure versus control of the privatized assets. The initial privatizations were free-wheeling and chaotic with undue influences from government officials and cronies. Consequently, corruption and stripping of the state assets privatized to the oligarchs were norm.

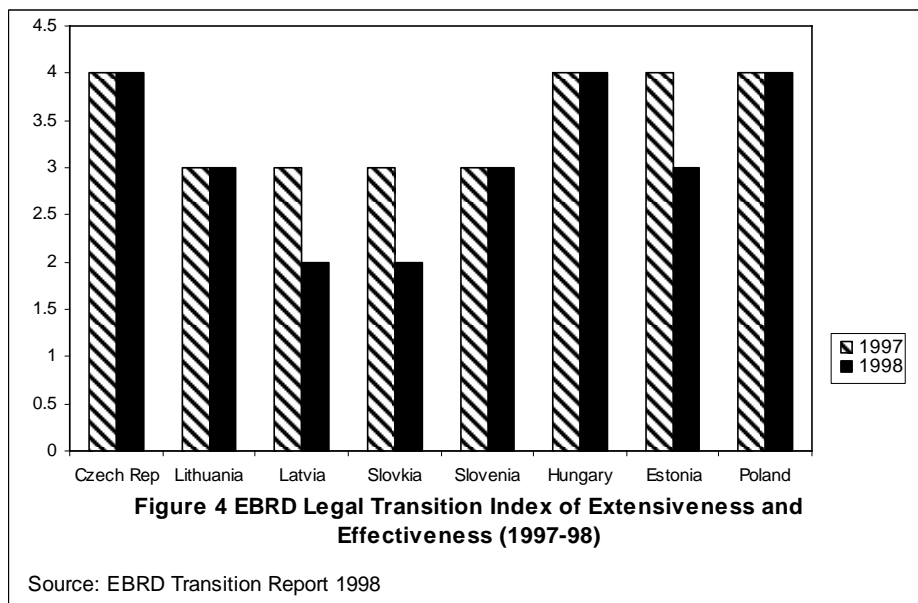


In the initial haste of privatization, the mass privatization of the state-owned assets gave control into the hands of the insiders (workers and management), distrustful of future prospects in a rapidly changing environment, who were interested in short-term gains through asset stripping. This was further exacerbated by the private voucher privatization programs, which diluted control of the privatized enterprises to such an extent that incentives in private ownership for oversight and monitoring were all but eroded. As a result, the enterprise sector of the EC8, burdened with the inherited inefficiencies and debt from the central planning era, was slow to restructure. However, enterprise restructuring has increased investment activity domestically from capital infusion, particularly from abroad (Figure 3). Foreign direct investment has been instrumental in boosting investment rates, contributing significantly to economic growth. Adopting sound accounting and auditing practices and transparencies will ensure that creditors, stockholders, and oversight authorities can rely on reliable information to make informed judgments, boosting investor confidence.



The rule-of-law in the legal sector underpins a sound financial system. Legal protection and recourse for savers and investors, particularly with respect to property rights and contracts, are fundamental to preventing a financial crisis and contagion from occurring. In 1997 and 1998, the European Bank for Reconstruction and Development (EBRD) conducted a survey in the transitional countries on the extensiveness and effectiveness of legal reforms in three areas of commercial law: pledge, bankruptcy and company law. The index ranged from less than one with little change in extensiveness

and effectiveness in commercial law reforms to 4+ with extensive and effective changes (Figure 4). Most of the EC8 have maintained a steady change while Latvia, Slovakia, Slovenia and Estonia have regressed in their progress of legal reforms. For the eight transition countries, the index for effectiveness has dropped from an average of 3.625 in 1997 to 2.17 in 1998. However, Slovenia transitioned sufficiently to meet EMU membership on January 2007.



The inconsistent and sometimes lack of enforcement of the enacted laws undermine respect for the legal system, promoting the public perception of government corruption and inadequacy. The challenge for the transition countries is to develop an effective legal framework of laws and enforcement in step with the expansion in financial activity and complexity.

Laws with respect to collateral pledges as a means of securing credit in the financial markets are important for both the lender and the borrower, particularly for movable property. Company laws related to the protection of shareholder's rights, preemptive and proxy rights, corporate governance and management accountability, and share registration and depositories are still weak in transition countries, which explain the underdevelopment of the long-term securities market. With respect to financial laws to safeguard the stability of the financial system, regulatory and supervisory enforcement has to be effective; establishing accounting standards whereby effective monitoring and oversight is practiced; and the development and promotion of



a financial infrastructure and corporate governance that are fair and transparent to prevent manipulation and fraud by insider management or corrupt officials. Bankruptcy laws should address the fair and smooth exit of failed financial institutions without much loss to its stakeholders or systemic damage. A smooth and orderly liquidation of a failed institution's assets according to the expectations under the law would do much to allay fears and uncertainty of investors. However, a current weakness faced by transition countries is the slow grind to resolve insolvent institutions due to the lack of distinction of the procedural process for criminal laws versus commercial laws through the court system.

The 1998 EBRD survey identified four main areas of legislative inadequacies in transition countries (EBRD Transition Report 1998):

- Outdated procedures for pledge and collateral registration and enforcement;
- Legislative uncertainty over recognition and enforcement of foreign judgments;
- Inadequate mechanism for civil judgments enforcement;
- Decreasing the level of economic crime and corruption.

Transitional countries have to institute a legal system whereby the rule-of-law is the guiding expectation, where transparency ensures fair and reasonable outcomes, where commercial and civil rights are protected, and where the judiciary system is independent and accountable.

#### **IV. EMU CONVERGENCE PROGRESS**

The Polish convergence to EU commercial laws with respect to bankruptcy proceedings, legal recourse and protection of creditors and stockholders' rights has improved the investment attractiveness of Poland. However, efficiency and enforcement have been weak and sporadic due to limited resources devoted to monitoring compliance, an overburdened court system, and the slower pace of legislative reforms within this area. For example, in Poland there is no differentiation between civil, criminal and commercial laws when going through the Polish court system. Consequently, any legal proceeding whether major or minor is a costly procedure, which can be tied up in the court system for a very lengthy period. Poland's extensiveness and effectiveness scores (2000-2001) declined (Table 1), particularly with respect to banking due to ineffectual supervision, regulation, and the failure of the Polish legislature to pass amendments to the Banking Act and the Central Bank Act (EBRD, 2001). These amendments would include changes concerning bank ownership, foreign branches activities in Poland, and Polish banks activities abroad. However, in June 2001 the Polish Parliament passed amendments more aligned to EU laws including electronic money transactions, consumer credits and loans, and letters of credit. The Czech Republic amended its bankruptcy laws in 1997 to speed up the bankruptcy process by granting courts greater power to liquidate the debtor's assets to meet creditors' claims. The courts also played a more active role by appointing a court administrator to oversee the bankruptcy proceedings. In 1998, Romania also introduced tough laws on fraudulent bankruptcy practices, punishable for up to twelve years.

**Table 1**  
Legal environment extensiveness and effectiveness of company law (Poland, Hungary, and Czech Republic)

	Extensiveness			Effectiveness		
	Poland	Hungary	Czech Rep.	Poland	Hungary	Czech Rep.
1997	4.0	4.0	4.0	4.3	4.0	4.0
1998	4.0	4.0	4.0	4.0	4.0	4.0
1999	4.0	4.0	3.3	3.0	3.7	2.7
2000	3.7	4.0	4.0	4.0	3.7	2.7
2001*	3.7	3.7	3.0	3.0	3.7	3.0

\* The last year of data published by EBRD.

Source: EBRD Transition Report 2002. Scores range between 1 and 4+ (maximum) based on surveys of legal experts by EBRD on the perception of legal reforms.

The institution of a deposit insurance safety net is also one of the benefits from the EU integration. As part of the EU *acquis communautaire*, bank deposits will be protected up to 20,000 euros per deposit. The arguments of moral hazard behavior by bank managers and depositors and its destabilizing effect are well known in the literature (Thies and Gerlowski, 1989; Hermes and Lensink, 1997; Demirguc-Kunt and Detragiache, 2000). A moral hazard problem is very possible for the EMU accession countries. If the accession countries succeed in attaining EMU membership, the harmonization of the 20,000 euros per deposit insurance for the member banks is high relative to the lower income levels and deposit sizes of the transition countries.

The reforms undertaken to meet EU membership and continued reforms are efforts by the transition countries to meet the EMU Maastricht requirements on fiscal budget balance, government debt, long-term interest rates, and price stability. For one year prior to membership, the Maastricht criteria are:

- Nominal inflation should be no more than 1.5% above the average for the three members of the EU with the lowest inflation.
- Long-term government bond rates should be no more than 2% points above the average for the three low-inflation members.
- The fiscal deficit should be no more than 3% of Gross Domestic Product.
- Government debt should be no more than 60% of GDP.

## V. METHODOLOGY AND EMPIRICAL FINDINGS

Our paper extends beyond the CEEC countries of Kozluk's 2003 study to include other EMU accession countries of Cyprus, and the south-eastern European countries of Romania, Bulgaria and Croatia. Romania and Bulgaria achieved EU membership on January 2007 while Croatia is still an EU accession country. Unlike the De Grauwe and Schnabl (2004b) study, which focused on the impact of inflationary tendency in the

convergence, our paper uses synthetic taxonomic analysis to evaluate the prospects of the EU8 and the south-eastern European countries in achieving EMU convergence.

We use data from 2003 in this paper, the year before EU accession. This is a significant year because economic fundamentals would be the most similar and favorable to EMU requirements. The data is primarily from the European Bank for Reconstruction and Development (EBRD Transition Report 2003) and the Organization for Economic Cooperation and Development (OECD Statistics Portal<sup>1</sup>). We investigate the feasibility of EMU accession for the 2004 EU members (the EC8 and Cyprus, excluding Malta due to the lack of available data) and Romania, Bulgaria, and Croatia. Romania and Bulgaria are the recent EU members while Croatia is a candidate country. The Maastricht criteria that all accession countries have to meet are used as indicator measures to avoid the criticism that economic indicators among the accession countries are too disparate and endogenous.

#### A. Description of Empirical Analysis and Methodology

The objective is to investigate how close the countries under investigation are from meeting the EMU Maastricht criteria. In this paper, we use the methodology of applying three synthetic taxonomic measures as defined by formulas (1) - (7) below:

$$\text{distance measure: } d_i = \sqrt{\sum_{k=1}^m (z_{ik} - z_{0k})^2} \quad (1)$$

$$\text{similarity measure}^2: p_i = 1 - \frac{d_i}{2\sqrt{m \cdot n}} \quad (2)$$

$$\text{development measure}^3: m_i = 1 - \frac{d_i}{d_0} \quad (3)$$

where for every  $i$ -th ( $i = 1, 2, \dots, n$ ) object and the  $k$ -th ( $k = 1, 2, \dots, m$ ) descriptive variable:  $z_{ik}$  is the  $k$ -th standardized diagnostic variable observed for  $i$ -th object:

$$z_{ik} = \frac{x_{ik} - \bar{x}_k}{S_k} \quad (4)$$

where  $z_{0k}$  is the  $k$ -th standardized diagnostic variable observed for the comparison patterns;  $x_{ik}$  is the  $k$ -th diagnostic variable observed for  $i$ -th object;  $\bar{x}_k$  is the mean calculated for the  $k$ -th diagnostic variable:

$$\bar{x}_k = \frac{\sum_{i=1}^n x_{ik}}{n} \quad (5)$$

$S_k$  is the standard deviation:

$$S_k = \sqrt{\frac{\sum_{i=1}^n (x_{ik} - \bar{x}_k)^2}{n}} \quad (6)$$

$d_i$  is the distance between the  $i$ -th object and the comparison pattern defined in formula (1);  $m_i$  is the synthetic development measure for the  $i$ -th object;  $d_0$  is the norm assuring that  $m_i$  reaches values ranging from 0 to 1:

$$d_0 = \bar{d} + 2 \cdot S_d \quad (7)$$

where  $\bar{d}$  is mean of  $d_i$ ,  $S_d$  is the standard deviation of  $d_i$ .

For each measure, the same system of standardization of data (4) is used to assure its comparability. In the analysis, we assume that the comparison pattern is defined by the requirements for joining EMU (Maastricht agreement), using four diagnostic variables:

1. the consumer price index (CPI) that describes nominal inflation;
2. a variable that describes long-term interest rate;
3. the general government balance (GGB) that describes the fiscal deficit;
4. the general government debt (GGD) that describes the government debt as a share of GDP.

Unfortunately, there is lack of consistent data (for all countries) describing long-term interest rates and omitted data could not be generated or transformed under reasonable assumptions. In particular, in some of the newer transition countries there is no history of long-term interest instruments. Long-term government financing through bond issuance did not exist prior to transition and is still very underdeveloped in transition countries. For interest rates that are available after the transition period, the rates are mixed, averaged out, or inconsistent for different countries. Thus, the synthetic measures are constructed based on three variables: CPI, GGB and GGD. The empirical study is carried out for countries that belong to three groups:

1. The countries that are the "EU4" EMU members most similar to the transition countries economically prior to membership (Greece, Portugal, Spain and Italy);
2. Countries that are EU members on May 2004 (9 countries, not including Malta),
3. New EU member countries (Bulgaria, Romania), and Croatia.

We assume that the comparison pattern is characterized by the following features:

Comparison Pattern 1: CPI = 1.5, GGB = -3 and GGD = 60 (Maastricht requirements, assuming lack of inflation in the three EMU countries with the lowest inflation rate i.e. inflation rate in these three countries equals zero).

Comparison Pattern 2: CPI = 2.269419, GGB = -2.8 and GGD = 52.5 (“Euro Area” for the 12 members features are taken as the comparison pattern characteristics).

## B. Empirical Findings

The results are presented in the tables below with the distance measure (1), the similarity measure (2), and development measure (3) calculated for each country. The distance measure (1) indicates the distance of i-th country from the comparison pattern. Thus, the smaller the value of this measure for a certain country the closer the country is to that comparison pattern. Therefore, the value of this measure for the comparison pattern should equal 0. The similarity measure (2) indicates how similar the country is to the comparison pattern, and lastly, the development measure (3) can be used to classify countries as:

- countries that are very close to the pattern when  $m_i \geq m + S_m$  (8)

- countries that are close to the pattern when  $m + S_m > m_i \geq m$  (9)

- countries that are not close to the pattern when  $m > m_i \geq m - S_m$  (10)

- countries that are far from the pattern when  $m - S_m > m_i$  (11)

where  $m$  is the mean of the synthetic development measures calculated for all countries in the sample:

$$m = \frac{\sum_{i=1}^n m_i}{n} \quad (12)$$

$S_m$  - is the standard deviation of development measures calculated for all countries in the sample:

$$S_m = \sqrt{\frac{\sum_{i=1}^n (m_i - m)^2}{n}} \quad (13)$$

The similarity and development measures should equal 1 for the comparison pattern.

The descriptive statistics for 2003 is presented in Table 2. In 2003, Greece and Italy have the highest government debt while the Czech Republic has the highest government budget imbalance. Romania has the highest inflation rate while Croatia and Bulgaria are characterized by a smaller inflation rate than the average and the median, and with relatively low levels of government budget imbalance and debt.

**Table 2**  
Descriptive statistics for 2003

Countries	CPI	GGB	GGD
Euro Area	2.269419	-2.8	52.5
GREECE	3.53	-4.6	<b>99.4</b>
PORTUGAL	3.28	0.4	60.1
SPAIN	3.03	-0.4	38
ITALY	2.67	-2.5	97.1
CYPRUS	4.14	-6.3	61.2
CZECH REPUBLIC	0.2	<b>-8.3</b>	29.7
LATVIA	3.3	-2	14.4
LITHUANIA	-0.08	-1.5	23.57
SLOVAKIA	8.5	-5	42.8
SLOVENIA	6.1	-1.5	31.9
HUNGARY	4.7	-5.5	57
ESTONIA	1.4	-0.5	7.4
POLAND	0.5	-6.9	50.1
BULGARIA	2	-0.7	48
CROATIA	2.4	-4.6	41.5
ROMANIA	<b>14.5</b>	-2.7	25.5
average	3.672907	-3.25882	45.89235
median	3.03	-2.7	42.8
first quartile	2	-5	29.7
third quartile	4.14	-1.5	57
minimal value	-0.08	<b>-8.3</b>	7.4
maximal value	<b>14.5</b>	0.4	<b>99.4</b>
standard deviation	3.405801	2.475304	24.31091

Source: Authors' own calculation

In the analysis below, the tables presented rank the countries from the best performers (the most similar to the comparison pattern) to the worst performers (the least similar to the pattern). It can be seen that all three taxonomic measures give the same ranking of countries. The analysis is carried out for 16 countries and the Euro Area: the old EU4 countries (Greece, Portugal, Spain and Italy), the nine 2004 EU members (excluding Malta), and Croatia, Bulgaria and Romania. Tables 3 and 4 show the results obtained for the two comparison patterns. Table 5 also shows the results obtained for Comparison Pattern 2 from the transformation of the diagnostic variables (14) - (15), by taking into account the impact of the deviation from the comparison pattern on country performance.

**Table 3**  
Comparison Pattern 1: taxonomic measures

CPI = 1.5, GGB = -3 and GGD = 60				
2003 measures of				
Ranking	Country	Distance	Similarity	Development
1.	Euro Area	0.405024	0.971643	<b>0.880088</b>
2.	CROATIA	1.056621	0.926022	0.687175
3.	BULGARIA	1.090513	0.923649	0.677141
4.	HUNGARY	1.417494	0.900756	0.580334
5.	SPAIN	1.492581	0.895498	0.558104
6.	PORTUGAL	1.509735	0.894297	0.553025
7.	CYPRUS	1.582849	0.889178	0.531379
8.	ITALY	1.608256	0.887400	0.523856
9.	POLAND	1.699557	0.881007	0.496826
10.	LITHUANIA	1.716358	0.879831	0.491852
11.	GREECE	1.881645	0.868259	0.442917
12.	SLOVENIA	1.914766	0.865940	0.433111
13.	LATVIA	2.029664	0.857895	0.399094
14.	SLOVAKIA	2.363284	0.834537	0.300322
15.	ESTONIA	2.438658	0.829260	0.278006
16.	CZECH REPUBLIC	2.572362	0.819899	0.238421
17.	ROMANIA	4.146652	0.709676	-0.227670

Source: Authors' own calculation

Table 3 results indicate that the probability of Romania achieving EMU membership in the near future is small<sup>5</sup>. Romania has the highest inflation of 14.5% in 2003 which is an atypical observation since 75% of all the countries under study have inflation rates smaller than 4.14% (Table 2). Surprisingly, some of the 2004 EU countries (Slovenia, Latvia, Slovakia, Estonia and the Czech Republic) are not close to achieving EMU membership. One reason may be explained by the Czech Republic, for example, which is characterized by the highest ratio of government fiscal imbalance relative to GDP (Table 2). It is worth noting that Greece, an old EMU member, seems to be in a similar predicament. This is not surprising if we consider that the general government debt for Greece for 1999 and 2003 is 104.1 and 99.4 percent of GDP, respectively. Greece and Italy have the highest government debt in 2003 (Table 2). There are nine countries that are close to fulfilling EMU requirements, meeting classification (9). The first two rankings in that group belong to Croatia and Bulgaria. Hungary, Cyprus, Poland and Lithuania also belong to this group together with Italy, Spain and Portugal.

**Table 4**  
Comparison Pattern 2: taxonomic measures

CPI = 2.269419, GGB = -2.8 and GGD = 52.5				
2003 measures of				
Ranking	Country	distance	similarity	development
1.	Euro Area	<b>0</b>	<b>1</b>	<b>1</b>
2.	CROATIA	0.875360	0.936826	<b>0.722667</b>
3.	BULGARIA	0.894779	0.935425	<b>0.716515</b>
4.	SPAIN	1.185797	0.914422	0.624314
5.	HUNGARY	1.351005	0.902500	0.571973
6.	PORTUGAL	1.402381	0.898792	0.555696
7.	LITHUANIA	1.495491	0.892072	0.526196
8.	SLOVENIA	1.527643	0.889752	0.516010
9.	CYPRUS	1.602279	0.884365	0.492364
10.	LATVIA	1.652876	0.880714	0.476333
11.	POLAND	1.786377	0.871079	0.434037
12.	ITALY	1.886868	0.863827	0.402199
13.	SLOVAKIA	2.111837	0.847591	0.330924
14.	ESTONIA	2.127736	0.846444	0.325887
15.	GREECE	2.145603	0.845154	0.320227
16.	CZECH REPUBLIC	2.550491	0.815934	-0.19195
17.	ROMANIA	3.823320	0.724076	-0.21131

Source: Authors' own calculation

In the next analysis, we use the “Euro Area” countries as the comparison pattern (Table 4). Only five countries kept their position in the ranking compared to Table 3. These countries are Croatia and Bulgaria (position 2 and 3), Portugal (position 6), Czech Republic and Romania (position 16 and 17). The other eleven countries changed their position in the ranking. Seven of the new and potential EU members are still close to the pattern. On the other hand, Italy and Poland belong to the group of “weak countries” while Slovenia and Latvia drew closer in distance to the EMU zone.

For the results above, we calculated the distance from the comparison patterns for the three variables CPI, GGB and GGD but we did not take into account if the deviation from the pattern gives better or worse country performance. For instance, for the pattern  $CPI = 3$ , whether the inflation rates equal 2 or 4 it would have the same deviation from the pattern. To test if the deviation from the comparison pattern has an impact on country performance, we can employ the following transformation of the diagnostic variables  $x_{ik}$  and variables that describe the pattern  $x_{0k}$ :



$$x_{ik}^* = \begin{cases} 0 & \text{if } x_{ik} - x_{0k} \leq 0 \\ x_{ik} - x_{0k} & \text{if } x_{ik} - x_{0k} > 0 \end{cases} \quad \text{for } x_{0k} \geq 0 \quad (14)$$

$$x_{ik}^* = \begin{cases} 0 & \text{if } x_{0k} - x_{ik} \leq 0 \\ x_{0k} - x_{ik} & \text{if } x_{0k} - x_{ik} > 0 \end{cases} \quad \text{for } x_{0k} < 0 \quad (15)$$

where:  $x_{ik}^*$  - the transformed diagnostic variable observed for i-th object. Note that after transforming (14) and (15) all patterns  $x_{0k}^* = 0$  though the standardized values are usually  $z_{0k}^* \neq 0$ . In other words, if i-th country fulfills the requirements of joining the EMU for the k-th variable, then  $x_{ik}^* = 0$ . If not, then  $x_{ik}^* = x_{ik} - x_{0k}$  or  $x_{ik}^* = x_{0k} - x_{ik}$ . To obtain the transformed values  $x_{ik}^*$  we must define the comparison pattern. We assume: CPI = 2.269419, GGB = -2.8 and GGD = 52.5 i.e. Comparison Pattern 2. The results of the analysis for the taxonomic measures (1) – (3), are presented in Table 5.

**Table 5**

Comparison Pattern 2: taxonomic measures calculated for transformed variables  $x_{ik}^*$

* $x_{ik}^*$ (15)	Pattern: CPI = 2.269419, GGB = -2.8 and GGD = 52.5			
	2003 measures of			
No.	Country	distance	similarity	development
1.	Euro Area	0	1	<b>1</b>
2.	LITHUANIA	0	1	<b>1</b>
3.	ESTONIA	0	1	<b>1</b>
4.	BULGARIA	0	1	<b>1</b>
5.	SPAIN	0.247791	0.982117	<b>0.941741</b>
6.	PORTUGAL	0.329239	0.976239	<b>0.922591</b>
7.	LATVIA	0.335755	0.975769	<b>0.921059</b>
8.	CROATIA	1.044618	0.924611	<b>0.754394</b>
9.	SLOVENIA	1.247971	0.909935	<b>0.706583</b>
10.	HUNGARY	1.75565	0.873297	0.587220
11.	CYPRUS	2.201684	0.841107	0.482351
12.	POLAND	2.379408	0.828281	0.440565
13.	SLOVAKIA	2.398016	0.826938	0.436190
14.	ITALY	3.036679	0.780847	0.286031
15.	CZECH REPUBLIC	3.191889	0.769645	0.249539
16.	GREECE	3.382024	0.755923	0.204835
17.	ROMANIA	3.98462	0.712435	0.063156

Source: Authors' own calculation

In Table 5, we obtain three countries and the aggregate “Euro Area” that fulfill all requirements. These countries are: Lithuania, Estonia and Bulgaria. Spain is very close to the pattern since it fulfills classification (8). Portugal, Latvia, Croatia and Slovenia meet classification (9), i.e. they are also close to the pattern. These results concur with Table 2 in that Spain, Portugal, Latvia, Slovenia and Romania fulfill the Maastricht requirements for GGB and GGD while Croatia, Poland and the Czech Republic fulfill the CPI and GGD requirements. However, Greece and Cyprus do not fulfill requirements for any of the variables. However, Italy, the Czech Republic, Greece and Romania are grouped in the weakest countries classification. We notice that three countries kept the same rankings as in Table 4. These countries are: Portugal, Slovakia and Romania.

## VI. CONCLUSION

The rapid economic and investment growth in the EC8 from the restructuring of their financial, legal and enterprise sectors is manifested in real GDP growth and market competitiveness. The evidence and analysis of this paper suggest that most of the EC8 countries are on the path to EMU accession in the near future. The results from using Comparison Pattern 1 suggest that Croatia, Bulgaria and Hungary are relatively close; Poland and Lithuania are close; while Slovenia, Latvia, Slovakia, Estonia and the Czech Republic are relatively far from joining. Romania does not qualify.

When compared to the “Euro Area” countries for Comparison Pattern 2, Croatia and Bulgaria are very likely to achieve EMU membership, Hungary Lithuania, Slovenia, Cyprus, and Latvia are close (Poland is very close to this group) while Slovakia, Estonia and the Czech Republic are still the weak countries. Again, Romania does not qualify under this comparison.

When our analysis takes into account the impact of deviations from the comparison patterns, the EC8 countries fall into four distinct groups: Group 1 (Lithuania and Estonia) is closest to EMU membership; Group 2 (Latvia and Slovenia) is close; Group 3 (Hungary, Poland and Slovakia) is not close to joining; and Group 4 (Czech Republic) is the furthest from achieving EMU membership. Croatia and Bulgaria are very close while Romania is very far from EU membership, not the least, EMU membership. The reason for Croatia and Bulgaria’s strong performance is because they are striving in their best reform efforts just to achieve EU membership.

Our analysis is based on the 2003 data in achieving EU membership in 2004. Surprisingly, Slovenia was the only EU8 country to achieve EMU membership in 2007. Romania, predicted to be far from achieving EU and EMU memberships, became an EU member in 2007 while Croatia, a favored country from our study, did not. On the other hand, Bulgaria, another favored country from our analysis, also achieved EU membership in 2007. The implication here is that once the hurdle of EU membership is attained it does not guarantee that reforms will be maintained or continued at the same speed.

Surprisingly, among the “Euro Area” EU member countries, Greece performed the worst relative to Portugal, Spain and Italy. Based on our study, the EMU comparison countries of Greece and Italy, together with the Czech Republic and Romania, have difficulty meeting the Maastricht conditions. Romania performed the worst while Croatia performed the best. The policy implication, for the transition

countries and the potential eurozone candidates, is that vigorous reforms have to be maintained to achieve a market economy that will converge with the European Union countries. For countries that are well ahead in their reform efforts, the EMU is within reach. However, a caveat is that once membership is attained a country can backslide, as exemplified by Greece.

#### ENDNOTES

1. [http://www.oecd.org/statsportal/0,2639,en\\_2825\\_293564\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/statsportal/0,2639,en_2825_293564_1_1_1_1_1,00.html)
2. Michalski, 2002.
3. Michalski and Jasionowicz, 1998, Muszyńska and Żuchowicz – Kwiatkowska, 2002.
4. In fact we should take  $d_0 = \bar{d} + 3 \cdot S_d$  to be sure that all development measures will reach the interval  $<0; 1>$ . But for the majority of measures it is enough to have variability interval constructed on  $2 \cdot S_d$ .
5. The value of the development measure is negative which also means that the distance of Romania to the EMU countries is very large. It shows that normalization of the synthetic development measure in the classification constructed around the arithmetic mean with the two standard deviations distance is too short for Romania.

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