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Abstract

The objective of this paper is to study capital market integration in smaller european countries and its implications for an international portfolio investment allocation. A time-varying analysis based on Barari (2004) suggests that the markets have recently started moving towards international financial integration. Results vary from country to country and sample countries can be broken down into distinctive groups according to their recent integration score performance: a) countries which are becoming increasingly integrated with both regional European and international equity markets (Estonia, Hungary, Czech Republic, Lithuania, Poland) b) countries which have becoming increasingly integrated with the regional market, while growing segmented with the world market (Latvia, Slovakia, Slovenia). This is an encouraging indicator in that none of the countries have been growing segmented from the European equity markets since the EU accession.

1) Introduction

The objective of this paper is to provide an assessment of a time-varying integration using a score analysis for a sample of eight Central and Eastern European countries, which have recently joined the European Union, namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. The applied methodology allows us to observe the status of European as well as World equity market integration over time.

The remainder of the paper is structured follows. Section 2 reviews the development of modern financial markets over the years and discusses the initiatives of the national and supranational bodies aimed at greater financial markets integration. Section 3 discusses issues involved in measuring financial integration and reviews the commonly used methodologies of identifying and analysing equity market integration, drawing examples and evidence of integration from the research on the topic. The theoretical framework of the integration score analysis as well as the methodology is discussed in Section 4. Section 5 discusses the data sample and the statistical methodology applied. Results of the integration score analysis are reviewed and the implications of findings are examined in Section 6. Finally, Section 7 draws together the paper's main findings and conclusions.

2) Theoretical Framework and Methodology

Has there been a significant degree of financial markets integration of the new EU member states into the European and Global market place? We answer that question by conducting an integration score analysis for the eight Eastern and Central European countries out of the ten new member states following the methodology proposed by Akdogan (1996, 1997) and later extended by Barari (2004) to account for regional as well as global integration. What follows is the review of their work on the topic, which sets up a theoretical framework and methodology for our analysis.

2.1) Theoretical Framework

Akdogan (1996) has used an international risk decomposition model (attributable to Markowitz-Sharpe-Lintner) to measure a differential degree of market integration across world capital markets, thus developing a measure alternative to the ones discussed above. The rationale for developing an easily obtainable measure of county equity market segmentation lies in the importance of such a tool in country selection for portfolio diversification purposes. The proposed measure of international equity market integration is a country's systematic risk contribution to the global benchmark market portfolio; a growing contribution implying a greater integration of the market with the benchmark. The countries are than ranked according to their systematic risk contributions and the portfolio funds are committed in proportion to their integration scores. Integration scores are calculated as a fraction of systematic risk in total country risk vis-à-vis the global benchmark. This measures the contribution of the country's market to global risk. Integration scores' calculation involves the use of a country's beta against the global benchmark portfolio. Akdogan also suggested computing adjusted systematic risk fractions - systematic risk relative to market value share, by weighing the integration scores by their share in world capitalisation. The measure of international integration is then measure by a country's contribution to world systematic risk relative to its contribution to the world market value.

The Akdogan (1996) work computes the degrees of integration of twenty six large countries for two sub-sample periods (1970s and 1980s) and then ranks the countries according to their adjusted integration score. While some of the markets became more integrated in the decade of 1980s (e.g. UK, Japan, France and most of the emerging markets) other markets have not (e.g. Finland, Spain, Denmark and Italy). Such findings do not, however suggest complete segmentation of these markets from the world market, rather they were less responsive to its trends. Akdogan (1997) extended the methodology to apply to individual securities and measured their integration with two benchmark portfolios: local market and world market.

Barari (2004) extended the Akdogan (1996, 1997) methodology in two respects. First the author addresses the issues of measuring regional versus global integration by computing integration scores for country indices against both a world benchmark index and a regional benchmark index. While a market is becoming less integrated with the world, it may be becoming increasingly integrated with the geographical

region in which it is located. Therefore such comparative examination of regional and world integration measures is very useful, especially in the light of considerable evidence of the growing tendency towards the formation of regional economic and political alliances and consequent intra-region integration, particularly in the EU (e.g. Aggarwal, Lucey and Muckley, 2004; Kearney and Poti, 2004; Voronkova, 2004; Kearney, 1998). By measuring the ration of regional to the global integration scores Barari suggests monitoring the status of regional vis-à-vis global integration of the countries' equity markets. Second, Barari addresses the issue of measuring a time-varying integration score to examine the developments in the patterns of financial integration. Time-varying nature of risk premium on equities and inter-market relationships has long been highlighted in the literature (e.g. Bekaert and Harvey, 1995; Longin and Solnik, 1995), it is therefore important to provide dynamic measures of equity market integration. Barari does so by measuring and plotting integration scores over different time windows (historical and moving average) instead of comparing integration scores over subsamples as was done by Akdogan (1996). After estimating the time-varying integration scores for a sample of six Latin American countries for the period of 1988-2001, he concludes that although in the 1980s and early 1990s there was generally a move towards regional and away from the global integration with the pace of global integration picking up in the late 1990s. This methodology was also used by him to point out the possible contagion effects from the Asian currency crisis to the Latin markets.

Following Akdogan (1996, 1997) and Barari (2004) we use a country's beta in calculating the integration scores and thus a brief discussion is necessary here to outline some of the issues involved in using the beta estimates in empirical research.

Beta evaluates undiversifiable risk for an asset in relation to a benchmark portfolio, measured as the expected covariance of the asset's returns with the returns on a market portfolio. It is estimated on practice as covariance between the rate of return on an asset and the return on the stock market index (which is used as a proxy of a well-diversified market portfolio). Akdogan (1997) and Barari (2004) point to a serious issue of the beta estimating procedures: betas are not stable and tend to significantly vary over time. Beta estimates are sensitive to the time intervals over which they were obtained. The methodology used in this paper follows Barari and

addresses this issue by estimating integration scores over historical and moving average time windows, thus capturing the time variation of integration status. The assumption of symmetrical returns series also poses a problem for empirical research on the capital markets, if it doesn't hold beta becomes an inappropriate measure of a country's systematic risk vis-à-vis the world benchmark portfolio. Problems associated with estimating betas imply that it can not be used to price risky assets or risk premiums. In the context of the proposed methodology, however, betas are used as a source of information on the country's sensitivity to the global market and as such are used in calculating the integration scores.

2.2) Methodology

This paper uses the methodology suggested by Akdogan (1996, 1997) and Barari (2004) and utilises the international risk decomposition model in measuring international equity market integration. Consider the following single index return-generating process of the *i*th country portfolio:

$$R_i = \alpha_i + \beta_i R_w + \varepsilon_i \qquad (1)$$

where R_i and R_w denote returns on the *i*th country index and on a benchmark world index respectively, α_i is the intercept term of a simple regression, β_i is the beta of a country *i* vis-à-vis the world benchmark index and ε_i is the regression error term or the idiosyncratic component of the foreign index. The variance of the *i*th portfolio described in (1) can be decomposed into the following components:

$$\text{var}(R_i) = \beta_i^2 \text{ var}(R_w) + \text{var}(\varepsilon_i) \qquad (2)$$

By diving both sides by var(R_i) we express the risk arguments on the right-hand side as fractions of total risk:

$$1 = p_i + q_i \qquad (3)$$

where

$$p_i = \frac{\beta_i^2 \, \mathrm{var}(R_w)}{\mathrm{var}(R_i)} \tag{4}$$

$$q_i = \frac{\mathrm{var}(\varepsilon_i)}{\mathrm{var}(R_i)} \tag{5}$$

In the equations (4) and (5) above, p_i and q_i yield us a measure of integration of the *i*th country equity market with the global market: p_i is a fraction of systematic risk country i contributes to the worldwide systematic risk, while q_i is a fraction of unsystematic risk. According to Akdogan a growing p_i (or a decreasing q_i) indicates greater integration of country i with the world market, as its contribution to worldwide systematic risk rises. Fraction of systematic risk in total risk divided by the respective share in the world market value yields a capitalisation-adjusted measure of integration:

$$\text{adjusted } p_i = \frac{p_i}{W_{iw}} \; ; \; W_{iw} = \frac{\mathrm{MC}_i}{\sum_{i=1}^{m} \mathrm{MC}_i} \tag{6}$$

$$\text{adjusted } q_i = \frac{q_i}{W_{iw}} \; ; \; W_{iw} = \frac{\mathrm{MC}_i}{\sum_{i=1}^{m} \mathrm{MC}_i} \tag{7}$$

where MC is market capitalisation and m is a number of countries in the world benchmark index. The adjusted measure of integration then becomes *i*th country contribution to the world systematic risk relative to its contribution to the world market capitalisation value; this yields a better measure of integration.

The methodology can be extended to address the issue of regional versus world integration in the following manner. Consider the following two index return-generating process of the *i*th country portfolio:

$$R_i = \alpha_i + \beta_{ir}\theta_r + \beta_{iw}R_w + \varepsilon_i \tag{8}$$

where θ_r is orthogonal to R_w and is obtained as residuals from the following regression:

$$R_r = \alpha_r + \beta_r R_w + \theta_r \qquad (9)$$

In the equations (8) and (9) above, R_i is the rate of return on the *i*th country portfolio, R_r and R_w are the rates of return on the benchmark regional and world portfolios respectively, implying that $R_i \in R_r \in R_w$. Barari (2004: 653) points out that by utilising the above model we effectively break down the rate of return on the *i*th country portfolio into three components: "(1) a component that is perfectly correlated with the rate of return on the domestic market portfolio, (2) a component of the international market portfolio's rate of return that is uncorrelated with the rate of return on the domestic market portfolio, and (3) a third component that is uncorrelated with either the first or the second component." As was pointed out earlier, θ_r is R_i orthogonal to R_w as it represents the part of variation in R_r that is unexplained by R_w.

The variance of R_i can then be decomposed down into the following components:

$$\text{var}(R_i) = \beta_{ir}^2 \text{var}(\theta_r) + \beta_{iw}^2 \text{var}(R_w) + \text{var}(\varepsilon_i) \qquad (10)$$

representing the regional and world systematic risk and unsystematic risk respectively. By diving both sides by var(R_i) we express the risk arguments on the right-hand side as fractions of total risk of investing in the *i*th country portfolio:

$$1 = a_i + b_i + c_i \qquad (11)$$

where

$$a_i = \frac{\beta_{ir}^2 \text{var}(\theta_r)}{\text{var}(R_i)} \qquad (12)$$

$$b_i = \frac{\beta_{iw}^2 \text{var}(R_w)}{\text{var}(R_i)} \qquad (13)$$

$$c_i = \frac{\text{var}(\varepsilon_i)}{\text{var}(R_i)} \tag{14}$$

a_i in the equation (12) above is a relevant measure of the *i*th country regional integration, implying that if the country's contribution to the regional systematic risk (which is uncorrelated with the world systematic risk) rises it is becoming more integrated with the regional market. b_i in the equation (13) above is a relevant measure of the *i*th country international integration, implying that if the country's contribution to the world systematic risk rises it is becoming more integrated with the world market. In turn, if the regional market is becoming increasingly integrated with the world market, a_i will be larger than b_i, while the regional market's segmentation from the rest of the world will be shown by a_i larger than b_i. Ths, by taking the ratio of by a_i to b_i the *i*th country's regional versus world integration can be observed. c_i in the equation (13) above measures the country's unsystematic risk.

Adjusted integration scores can be obtained by weighing a_i to b_i by each country's share in the regional and world capitalization respectively:

$$\text{adjusted } a_i = \frac{a_i}{W_{ir}};\ W_{ir} = \frac{\text{MC}_i}{\sum_{i=1}^{n} \text{MC}_i} \tag{15}$$

$$\text{adjusted } b_i = \frac{b_i}{W_{iw}};\ W_{iw} = \frac{\text{MC}_i}{\sum_{i=1}^{m} \text{MC}_i} \tag{16}$$

where MC is market capitalisation and n is a number of countries in the regional benchmark index, while m is a number of countries in the world benchmark index. The adjusted measure of integration then becomes *i*th country contribution to the regional and world systematic risk relative to its contribution to the regional and world market capitalisation value.

3) *Data and Statistical Methodology*

3.1) Data

We use monthly closing prices for the Standard and Poor (S&P) indices of the eight Central and Eastern European markets: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. e. We also use the European S&P EU350 index as a proxy for the regional benchmark index and an international S&P Global 1200 index as a proxy for the world benchmark index. The use of S&P indices throughout offers consistency in terms of index calculations and compositions among the countries. All indices are denominated in US $, which yields a viewpoint of an outside of Europe investor. The data was obtained from the DataStream database The data for each country covers a different sample period up to the end of 2004; this is due to data availability constraints for some of the emerging markets. Table 1 below gives the start dates for every index.

3.2) Statistical Methodology

We first transform the country, region and global benchmark index values into returns in the following manner: $R_{i,t} = \ln(I_{i,t} / I_{i,t-1})$, where $I_{i,t}$ is the value of the index at end of month t for stock market index i and $I_{j,t-1}$ is the value of the index at end of period month $t-1$ for stock market index i. The a_i and b_i scores (as in equations (12) and (13) above) as well as the ratio of a_i / b_i are then estimated under varying time windows and subsamples. The historical and moving average windowing methods are used, following a methodology suggested by Barari:

> The historical plots figure the integration scores from the beginning of the sample period to the end. At any point in time, the historical plots contain information regarding all prior observations. The trend of the historical plots reflects changes in the degree of integration over longer time horizons. Cross-country comparisons of the historical plots should therefore reveal information about the changing status of integration of the different countries in the sample over time. (Barari, 2004: 657)

For the historical plots we first compute the integration scores for a period of 3 years, starting from respective start dates of the samples we then extend the end date by a year[2]. The historical plots reflect the marginal impact of adding 12 monthly observations on the integration status.

The moving average estimates provide integration scores over an n year window prior to any period t, with t varying across the sample.

> These plots are expected to show greater sensitivity to economic, political, or financial events resulting in wider fluctuations in integration scores. Hence, comparison of moving average plots across countries should provide information about their relative sensitivity to exogenous shocks, and in turn, shed some light on their relative stability. (Barari, 2004: 661)

Due to the data availability, we only estimate the moving average plots for Czech Republic, Hungary and Poland and investigate whether a major regional exogenous shock of the Russian default in 1998 had spillover effects on the other Eastern and

[2] For Estonia, Latvia and Slovakia the initial estimation period covers the first year available.

Central European countries. We calculate the integration scores for a period of January 1994 till December 1999, using a three year moving average window and then shifting the start and end dates by a quarter. This way, the pre and post crisis period is covered.

4) Empirical Results

In this section we empirically estimate and discuss the integration scores for the eight Eastern and Central European countries, namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. We start by plotting the index values for the countries in our sample over time. As one can see from Figure 1 below, there are a few sharp declines which hit all indexes. The most notable, perhaps is the year 1998. Following the Asian crisis of 1997, the Russian ruble barely withstands several speculative attacks. Ultimately, with the Central Bank of Russia loosing billions of dollars and the currency and bond markets weakened, Russia devalues the ruble, defaults on home debt and suspends payments on foreign debt. This was detrimental to the capital markets worldwide and all of the countries in the sample have declined because of that. After the period of recovery through the 1999 and 2000, the world capital markets have been hit by global economic downturn and by the "dot-com" bubble. Recent years' performance is due to a slow but steady upturn in the world economy.

Table 2 above provides the estimated integration scores for countries, while Figure 2 and provides cross-country comparison of the historical *a* and *b* plots for the eight countries of our sample. The historical *a* plots suggest that the countries have generally shown a decline in regional integration until 2003. That year the European Union accession treaty was agreed upon and the single European market initiatives of free capital, goods and services movement became more real. The countries joined the EU in May 2004. The effect of the accession has been to increase the regional equity market integration as indicated by the sharp rise in the *a* score. An interesting detail of the plots is that the emerging equity markets of Estonia, Latvia, Slovakia and Lithuania have shown a very sharp increase in integration with the European equity markets, while reaction to the accession pf the more mature markets of Hungary,

Poland and the Czech Republic and Slovenia has been less pronounced. The evident down trend in the *a* plots can be attributed to the general economic environment in the EU and the uncertainty, the future accession bring to the market, the world equity markets have also experienced a downturn. Slovenia, Lithuania, Poland and Slovakia exhibit signs of regional segmentation during the period of 1998-1999 after the Russian crisis. This issue is later examined using the moving average plots. In the new millennium Hungary, Poland, Czech Republic and Estonia have all shown increasing international integration after the world equity market recovered from the bubble of 2001; this is indicated by increasing *b* scores. Latvia, Lithuania Slovenia and Slovakia have been growing less integrated with the world market. The effect of the 1998 crisis has been such that the general tendency among countries in its aftermath ahs been greater international segmentation.

A growing *a/b* ratio implies of increasing regional integration, decreasing global integration, faster growth in regional relative to global integration, or a slower decline in regional relative to global integration. From an investor's point of view, higher ratios of a to b are desirable for risk reduction as well as return improvement purposes of international diversification. Figure 3 shows the historical plots of the *a/b* ratio. Czech Republic, Hungary, Latvia, Poland and Slovenia have shown a growing *a/b* ratio, indicating that the European equity market integration dominates the international, while Estonia, Lithuania and Slovakia have shown a sharp decrease in the ratio after the accession, indicating either that the single market initiatives are not being implemented or that the membership in the EU ahs opened these markets to the international investor, who have been faster to incorporate these markets into their portfolios than the European investor.

The moving average integrations score estimates have been used to focus on the cross-country contagion effects of the Russian currency crisis. Due to data availability constraints, the scores were only estimated for the mature Central European markets of Czech Republic, Hungary and Poland. The calculated integration scores are given in Table 3, while the *a* and *b* moving average estimates are plotted in Figure 4. Hungary and Poland exhibit a large increase in the *b* score in the immediate aftermath of the crisis with a declining trend after the crisis, with the *a* scores following roughly the same trend with much less fluctuation close to zero. The *a* and *b* scores for Hungary and Poland also show a declining trend. Czech Republic's scores behave in the opposite way. If contagion is accompanied by increased cross-market linkages after a shock to a country or region, then the above results may be a preliminary indicator of cross-country contagion.

5) Conclusions

The integration score results vary from country to country and sample countries can be broken down into distinctive groups according to their recent integration score performance: a) countries which are becoming increasingly integrated with both regional European and international equity markets (Estonia, Hungary, Czech Republic, Lithuania, Poland) b) countries which have becoming increasingly integrated with the regional market, while growing segmented with the world market (Latvia, Slovakia, Slovenia). This is an encouraging indicator in that none of the countries have been growing segmented from the European equity markets since the EU accession.

Such findings have strong implications for international portfolio diversification. In that with greater equity market integration opportunities for profitable international diversification are reduced. Therefore, countries such as Latvia, Slovakia and Slovenia provide diversification opportunities for an international investor, in that they are free of capital controls and are segmented from an international market to a certain degree, all of which imply lower risk and higher return from investing in the countries' portfolios. The international investor community is fast to utilise such opportunities. It has been mentioned earlier that a growing historical *a/b* ratio for Czech Republic, Hungary, Latvia, Poland and Slovenia may be interpreted as the dominance of sophisticated international investors over the countries' equity markets.

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Figure 1: Indexes month-end values (measured in US $)

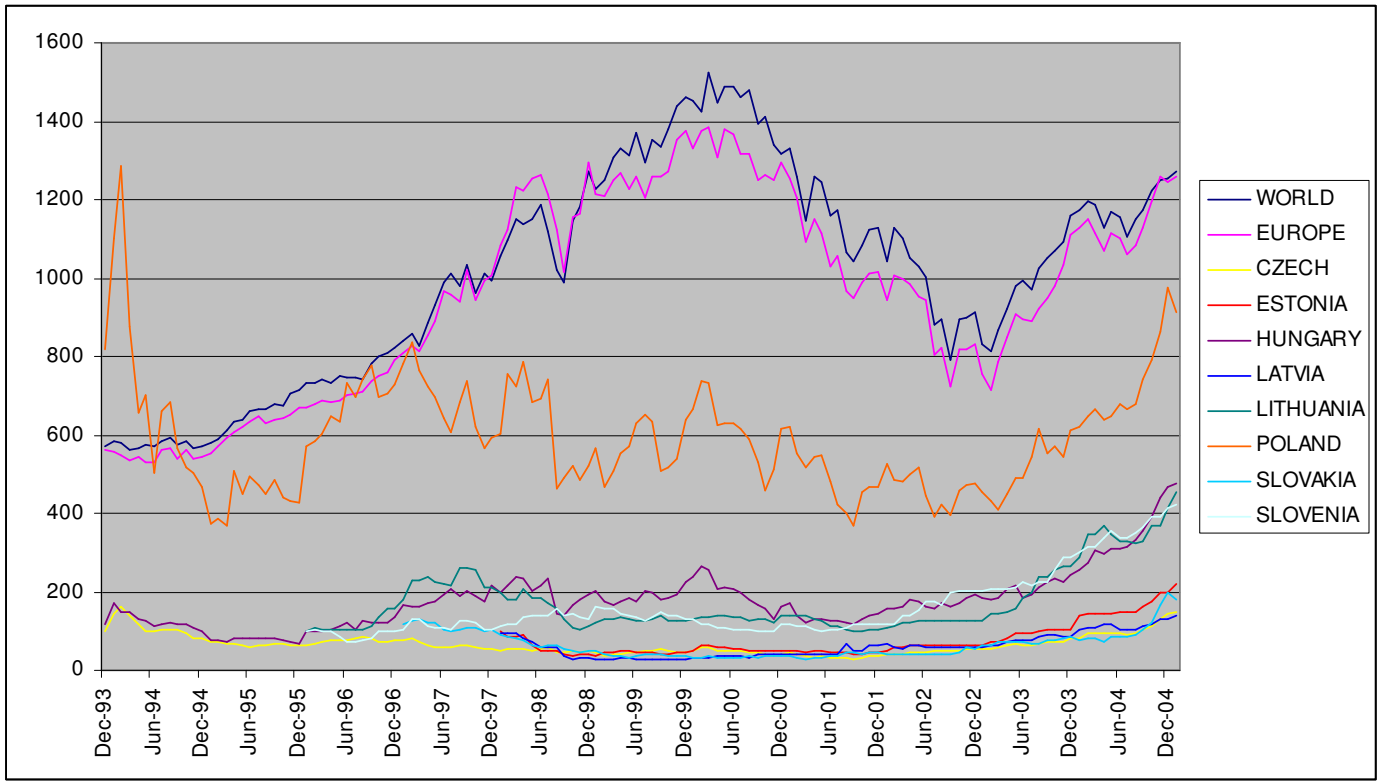
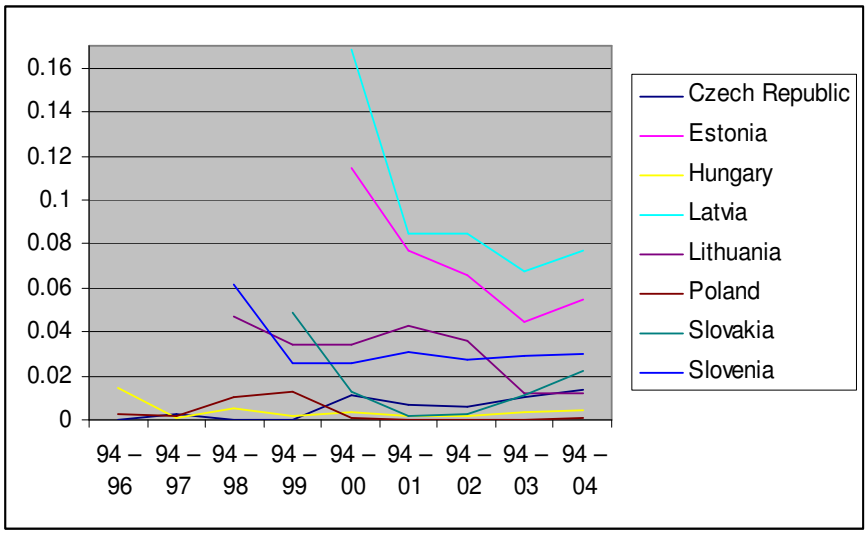


Figure 2: Historical *a* and *b* plots

***a* plots:**



***b* plots:**

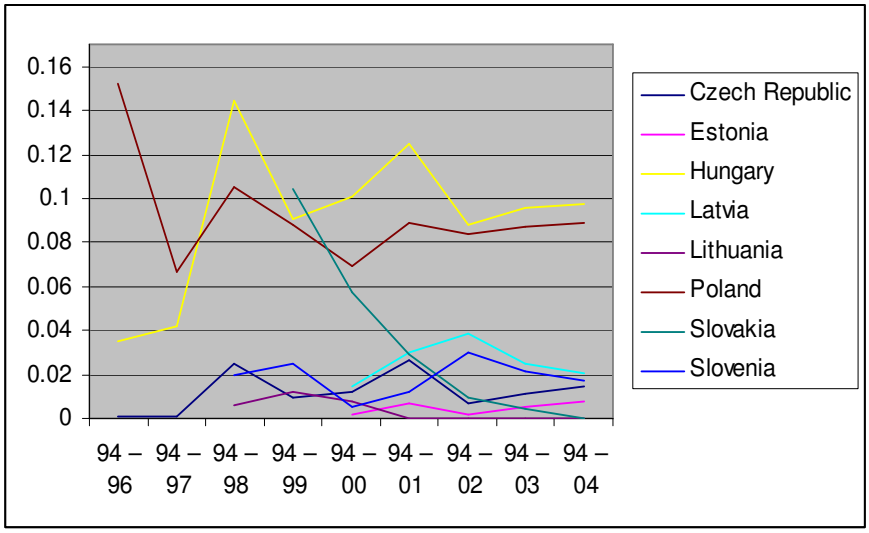
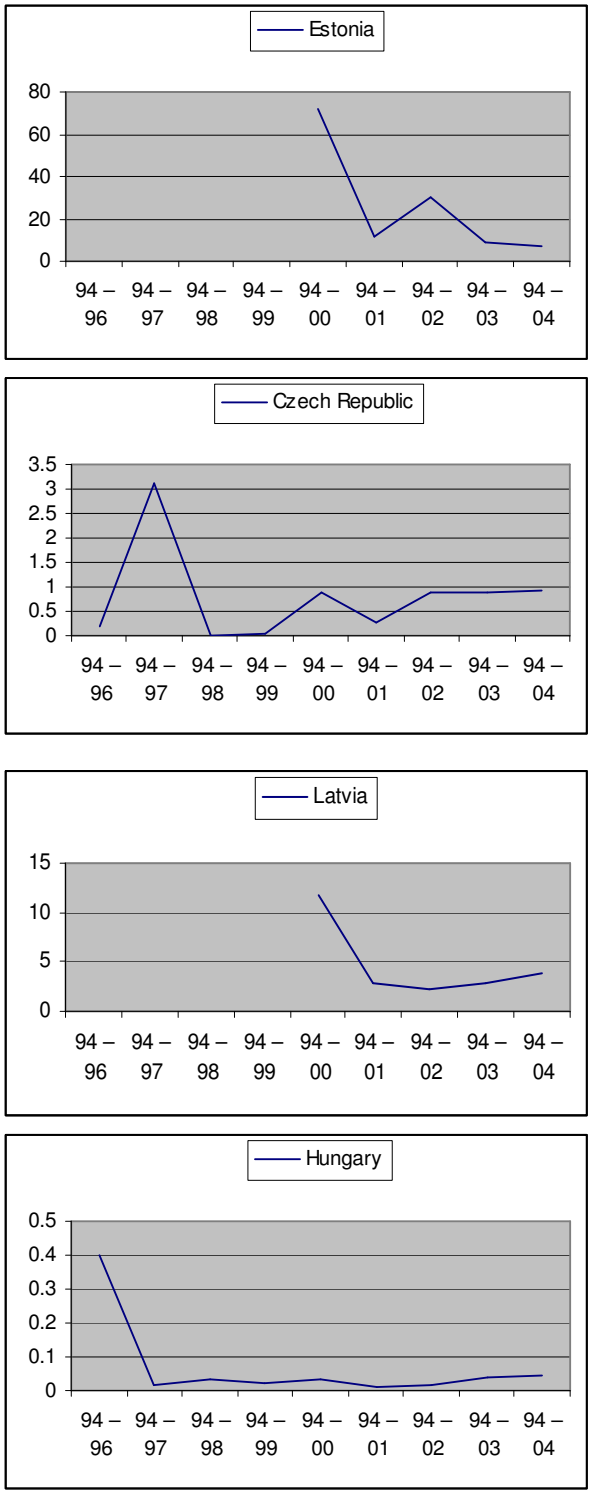
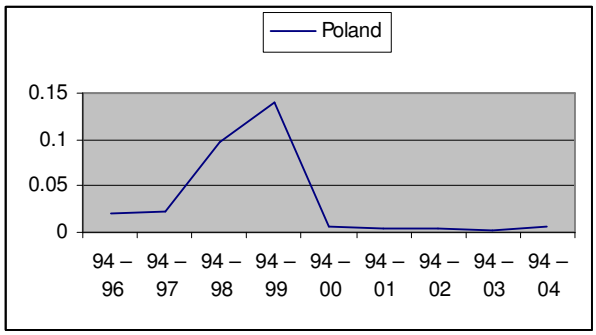
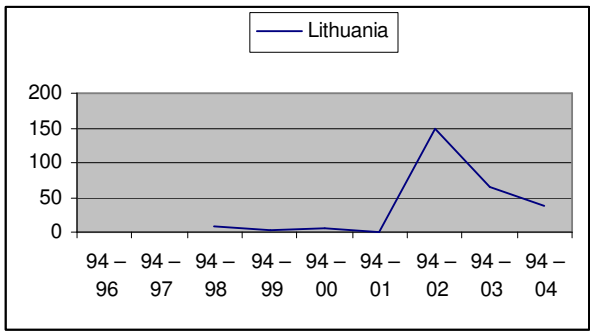
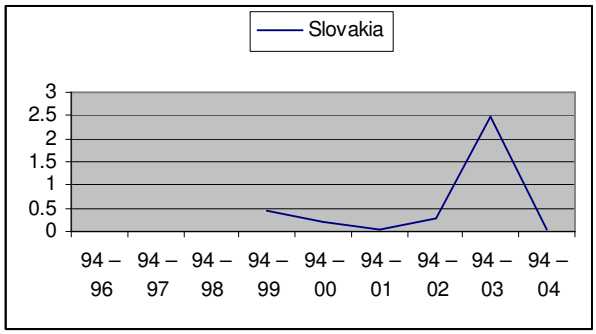


Figure 3: Historical *a* / *b* plots




Poland
0.15
0.1
0.05
0
94 – 96
94 – 97
94 – 98
94 – 99
94 – 00
94 – 01
94 – 02
94 – 03
94 – 04


Lithuania
200
150
100
50
0
94 – 96
94 – 97
94 – 98
94 – 99
94 – 00
94 – 01
94 – 02
94 – 03
94 – 04


Slovakia
3
2.5
2
1.5
1
0.5
0
94 – 96
94 – 97
94 – 98
94 – 99
94 – 00
94 – 01
94 – 02
94 – 03
94 – 04

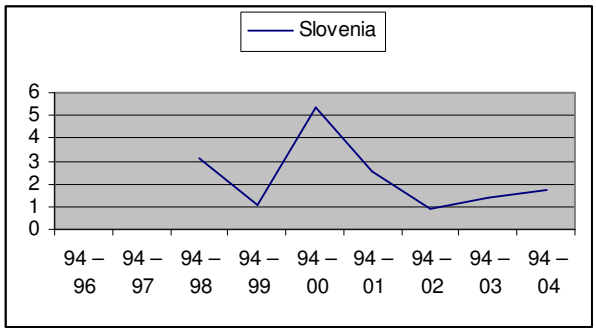
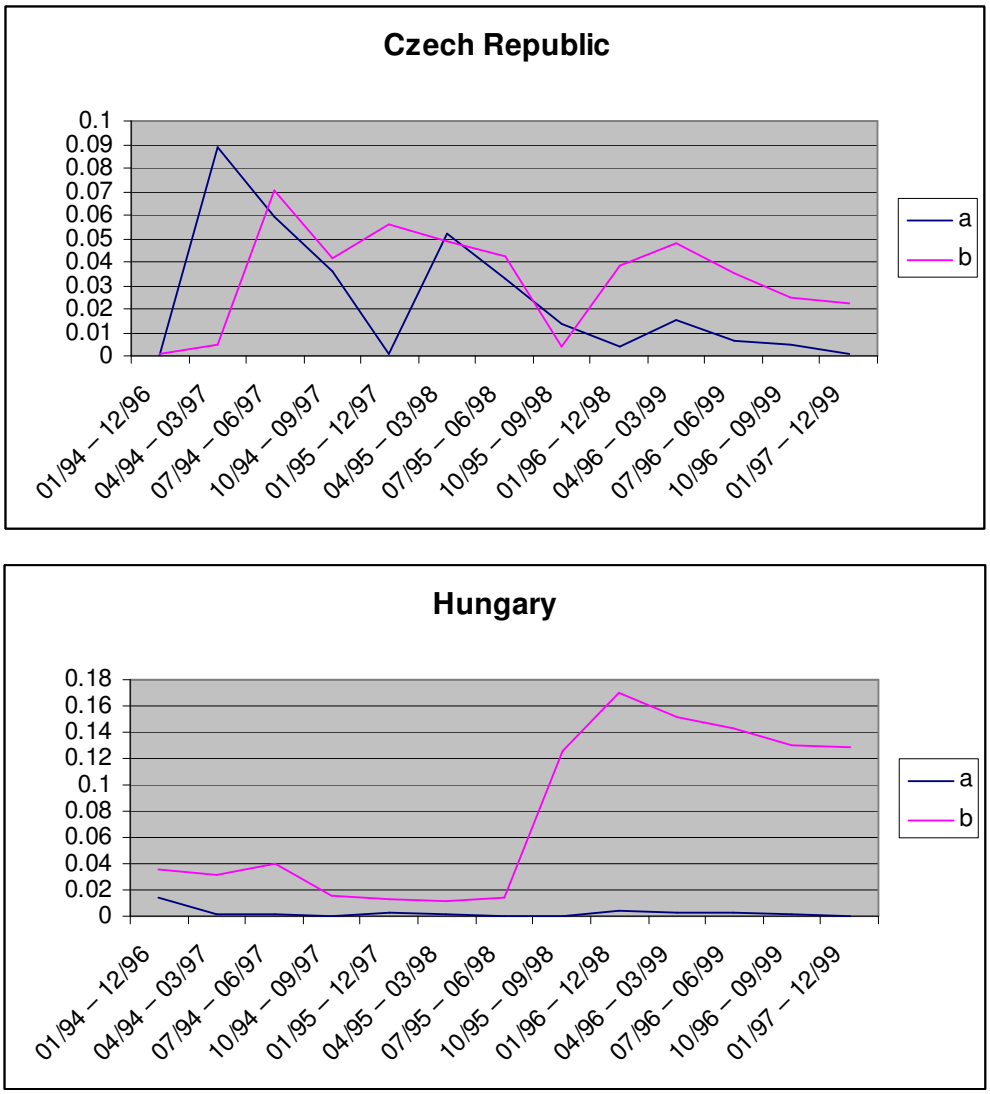

Slovenia
6
5
4
3
2
1
0
94 – 96
94 – 97
94 – 98
94 – 99
94 – 00
94 – 01
94 – 02
94 – 03
94 – 04

Figure 4: Moving average *a* and *b* plots



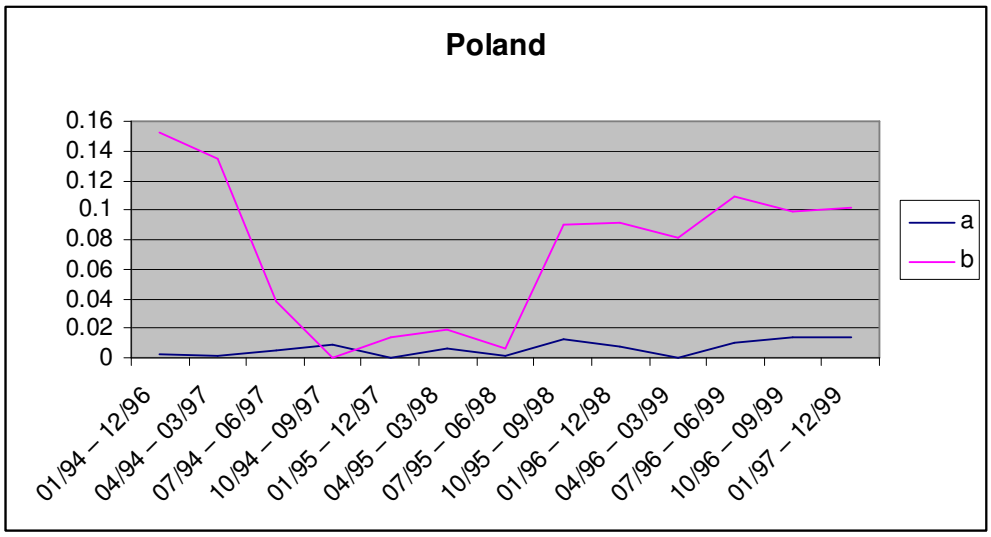

Poland
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
01/94 – 12/96
04/94 – 03/97
07/94 – 06/97
10/94 – 09/97
01/95 – 12/97
04/95 – 03/98
07/95 – 06/98
10/95 – 09/98
01/96 – 12/98
04/96 – 03/99
07/96 – 06/99
10/96 – 09/99
01/97 – 12/99
a
b

Table 1: Sample range information

Country	Start Date
Czech Republic	Dec 1993
Estonia	Jan 1998
Hungary	Dec 1993
Latvia	Jan 1998
Lithuania	Dec1995
Poland	Dec1993
Slovakia	Jan 1997
Slovenia	Dec 1995
S&P EU350	Dec 1993
S&P Global 1200	Dec 1993

Table 2: Historical integration scores

Period	**Czech Republic**			Period	**Estonia**		
	a	*b*	*a/b*		*a*	*b*	*a/b*
94 – 96	0.0002	0.0009	0.1934				
94 – 97	0.0029	0.0009	3.0973				
94 – 98	0.0002	0.0251	0.0063				
94 – 99	0.0003	0.0098	0.0335				
94 – 00	0.0108	0.0123	0.8781	98 – 00	0.1146	0.0016	72.1642
94 – 01	0.0072	0.0265	0.2717	98 – 01	0.0773	0.0068	11.3980
94 – 02	0.0058	0.0066	0.8788	98 – 02	0.0656	0.0021	30.6281
94 – 03	0.0101	0.0115	0.8783	98 – 03	0.0442	0.0050	8.7934
94 – 04	0.0136	0.0148	0.9189	98 – 04	0.0551	0.0073	7.4973
Period	**Hungary**			Period	**Latvia**		
	a	*b*	*a/b*		*a*	*b*	*a/b*
94 – 96	0.0141	0.0352	0.4010				
94 – 97	0.0007	0.0418	0.0161				
94 – 98	0.0051	0.1442	0.0352				
94 – 99	0.0021	0.0902	0.0238				
94 – 00	0.0033	0.1005	0.0331	98 – 00	0.1680	0.0142	11.8490
94 – 01	0.0017	0.1246	0.0133	98 – 01	0.0848	0.0302	2.8083
94 – 02	0.0017	0.0881	0.0189	98 – 02	0.0848	0.0381	2.2250
94 – 03	0.0035	0.0953	0.0370	98 – 03	0.0676	0.0244	2.7675
94 – 04	0.0043	0.0971	0.0444	98 – 04	0.0766	0.0203	3.7730
Period	**Lithuania**			Period	**Poland**		
	a	*b*	*a/b*		*a*	*b*	*a/b*
				94 – 96	0.0029	0.1520	0.0193
				94 – 97	0.0014	0.0668	0.0217
96 – 98	0.0473	0.0062	7.5756	94 – 98	0.0103	0.1055	0.0979
96 – 99	0.0338	0.0120	2.8139	94 – 99	0.0124	0.0880	0.1408
96 – 00	0.0342	0.0077	4.4103	94 – 00	0.0005	0.0696	0.0068
96 – 01	0.0428	0.0000	0.0428	94 – 01	0.0003	0.0891	0.0037
96 – 02	0.0356	0.0002	148.3312	94 – 02	0.0004	0.0833	0.0043
96 – 03	0.0120	0.0002	63.5308	94 – 03	0.0002	0.0873	0.0027
96 – 04	0.0123	0.0003	37.3572	94 – 04	0.0005	0.0888	0.0051
Period	**Slovakia**			Period	**Slovenia**		
	a	*b*	*a/b*		*a*	*b*	*a/b*
				96 – 98	0.0618	0.0200	3.0856
97 – 99	0.0485	0.1045	0.4638	96 – 99	0.0257	0.0247	1.0433
97 – 00	0.0127	0.0570	0.2223	96 – 00	0.0254	0.0048	5.3080
97 – 01	0.0017	0.0291	0.0592	96 – 01	0.0306	0.0119	2.5825
97 – 02	0.0026	0.0090	0.2884	96 – 02	0.0270	0.0295	0.9137
97 – 03	0.0109	0.0044	2.4596	96 – 03	0.0293	0.0215	1.3622
97 – 04	0.0218	0.0000	0.0218	96 – 04	0.0296	0.0173	1.7141

Where *b* tends to zero, *a/b* is replaced by *a*

Table 3: Moving average integration scores

Period	**Czech Republic**			Period	**Hungary**		
	a	*b*	*a/b*		*a*	*b*	*a/b*
01/94 – 12/96	0.0002	0.0009	0.1934	01/94 – 12/96	0.0141	0.0352	0.4010
04/94 – 03/97	0.0885	0.0045	19.5020	04/94 – 03/97	0.0008	0.0314	0.0246
07/94 – 06/97	0.0589	0.0700	0.8415	07/94 – 06/97	0.0019	0.0401	0.0465
10/94 – 09/97	0.0360	0.0413	0.8727	10/94 – 09/97	0.0001	0.0157	0.0050
01/95 – 12/97	0.0005	0.0558	0.0085	01/95 – 12/97	0.0026	0.0132	0.1995
04/95 – 03/98	0.0520	0.0492	1.0566	04/95 – 03/98	0.0016	0.0110	0.1463
07/95 – 06/98	0.0330	0.0428	0.7702	07/95 – 06/98	0.0001	0.0145	0.0069
10/95 – 09/98	0.0133	0.0037	3.5960	10/95 – 09/98	0.0005	0.1261	0.0037
01/96 – 12/98	0.0043	0.0387	0.1073	01/96 – 12/98	0.0038	0.1702	0.0223
04/96 – 03/99	0.0154	0.0484	0.3186	04/96 – 03/99	0.0030	0.1511	0.0198
07/96 – 06/99	0.0061	0.0355	0.1716	07/96 – 06/99	0.0025	0.1431	0.0175
10/96 – 09/99	0.0048	0.0251	0.1906	10/96 – 09/99	0.0008	0.1296	0.0059
01/97 – 12/99	0.0012	0.0222	0.0532	01/97 – 12/99	0.0001	0.1286	0.0008

Period	**Poland**		
	a	*b*	*a/b*
01/94 – 12/96	0.0029	0.1520	0.0193
04/94 – 03/97	0.0009	0.1344	0.0068
07/94 – 06/97	0.0052	0.0382	0.1374
10/94 – 09/97	0.0086	0.0003	32.1704
01/95 – 12/97	0.0002	0.0135	0.0141
04/95 – 03/98	0.0063	0.0189	0.3347
07/95 – 06/98	0.0011	0.0065	0.1660
10/95 – 09/98	0.0131	0.0907	0.1447
01/96 – 12/98	0.0076	0.0919	0.0823
04/96 – 03/99	0.0001	0.0816	0.0017
07/96 – 06/99	0.0105	0.1096	0.0962
10/96 – 09/99	0.0134	0.0986	0.1363
01/97 – 12/99	0.0139	0.1017	0.1370

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