Working papers

New trends in accounting and management

Universitat de Lleida
Departament d'Administració d'Empreses i Gestió Econòmica dels Recursos Naturals

Financial convergence in transition economies

EU enlargement

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OBJETIVOS

La colección pretende ser un instrumento de difusión de la investigación actual, realizada dentro del ámbito de Administración de Empresas, por los miembros de las Universidades coparticipantes, así como de los investigadores visitantes de las mismas, que todavía no haya sido publicada en una revista o en un libro. Con su publicación se pretende dar a conocer el estado actual de la investigación para que sea discutida y mejorada a partir de las sugerencias recibidas.

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FINANCIAL CONVERGENCE IN TRANSITION ECONOMIES: EU ENLARGEMENT

Abstract

This paper analyses the financial impact of the enlargement of the European Union (EU) to include 10 new Central and Eastern European Nations (CEEN) on firms' business and financial structures. To this end, we employ quantitative analytic techniques and financial ratios. In this context, we hope to discover whether firms in the new EU member States tend to converge with business in the Europe of the 15 in terms of the structure of firms' financial statements. We examine the extent to which the increasing integration of the former may foster the convergence of productive structures. The methodology followed consists of an analysis of the evolution of 12 financial ratios in a sample of firms obtained from the AMADEUS data base. To that end, we perform a Dynamic Factor Analysis that identifies the determining factors of the joint evolution of deviations in the financial ratios with respect to the average value of firms in the EU-15. This analysis allows us to analyse the convergence in each of the CEEN nations with respect to the EU-15.

Keywords

EU enlargement, financial structure, financial convergence, financial ratios, dynamic factor analysis, Bayesian inference.

Acknowledgements

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1. INTRODUCTION

In May 2004 ten new countries, eight of them in Central and Eastern Europe as well as Malta and Cyprus, joined in the largest of the EU's enlargements. These new members of the EU were obliged to walk a hard road throughout the 1990s before finally joining. The fall of the former USSR, and with it the demise of the planned economy, enabled the countries of Central and Eastern Europe to embark upon the transition to a market economy, resulting in the privatisation of State firms and a gradual approach to the European Union. This paper considers the period 1998-2004, precisely the years in which the process of privatisation and convergence with the EU economy was consolidated.

Numerous studies have analysed the transition of the new member states towards the market economy. Initially, the proximity and European vocation of the candidate countries suggested that convergence with the 15 member States of the European Union (the EU-15) would be swift, and these studies therefore focused on integration processes, which at that time took the form of institutional agreements and accession negotiations (Grosfeld and Roland, 1997). Current research is concerned mainly with enlargement and its consequences, since political and institutional integration has now become a reality (Sohinger, 2005; Deliktas and Balcilar, 2005).

The integration of these countries into the European Union is observable in the degree of convergence in their firms' productive structures and, therefore, in the competence and capacity of these structures to adjust to activity in the European single market (Rivau-Danset et al, 2005). In this context, the degree of approximation in companies' financial structures is important because it throws light on the path that companies in the accession countries will need to walk to achieve financial structures similar to those of firms in the EU 15. This concept of proximity suggests an idea of financial convergence in the structures of companies' financial statements, which is the one used in this paper.

Factors specific to each country can determine the financial structures of local companies. Some studies have looked at international differences in capital structures (Aggarwal, 1981; Rajan and Zingales, 1995; Park, 1998), while others address differences in the financial structures of companies in the European Union (Prasad et al, 1996). The results obtained are mixed in terms of identifying consistent differences between countries. The reason is that the studies performed observe differences in structures from country to country, but these may be due more to the factors determining firms' own captal structure than to differences between countries. Furthermore, some hypotheses fail to explain variations between countries in terms of capital structure. Nevertheless, these authors do show that national differences in the financial structures of companies are due to attitudes towards indebtedness, differences in the development of the banking system, different tax systems and to other local economic and social differences (Hall et al., 2004).

In light of previous studies, we depart from the hypothesis that the speed of convergence achieved by companies in each Central Eastern European Nations (CEEN) will be determined by the characteristics of its political and economic systems. Rather, we posit that the movement of financial ratios will be affected by the legislation governing corporate progress. Thus, labour legislation in each country will influence the evolution of wage costs. Likewise, profit ratios will be affected by the local tax system, as well as by the evolution of interest rates as they tend towards the European average. A positive evolution in these factors will orientate the new countries in the EU towards economic convergence and will allow an increase in corporate profits (Landesmann and Stehrer, 2000). Supposedly, those countries displaying a significant improvement in their financial indicators will gain advantages in the location of international investment projects, especially, those prioritising the use of the receiving country as a production and export centre.

To answer these and other questions, we have performed a statistical analysis of the joint evolution of ratios via a Dynamic Factor Analysis based on accounting data from European firms obtained from the balance sheets and income statements contained in the AMADEUS data base. Given the small sample size available by series (7 data) and the existence of missing data and different period of observations for each country and each analysed ratio (see Table 3 below), we use a Bayesian approach to estimate the parameters of the model, allowing us to make exact inferences using MCMC methods (see, for example, Robert and Casella, 2004).

Based on this analysis, we have identified three factors which synthesize the joint evolution of the ratios over the period of the study. These are 1) returns vs. cost of debt, 2) productivity and 3) indebtedness. Using this information, we examine the gaps existing between the ratios of each of the new member States and European averages ratios. The results obtained reveal that convergence between the new European countries and the EU is still a long way off in the financial structures of their firms. In fact, only the ratios related to the returns vs. cost of debt factor exhibit some approximation to the values of the EU countries at the end of the period analysed. This process has been driven largely by falling interest rates, which have benefited Central and Eastern European enterprise. The other ratios analysed, which are related to the productivity and indebtedness factors, show scant signs of convergence because of the structural differences in the economic systems of the CEEN, where labour regulation, the situation of the financial system and tax reform prevent firms from catching up.

These differences may be relevant for the purposes of deciding the moment at which the countries analysed should join the Monetary Union. Entry criteria and requirements were established in Maastricht and were associated with the optimum currency areas (OCA) researched by Mundell (1961), McKinnon (1963) and Kenen (1969). Compliance was considered necessary to ensure that the countries seeking Monetary Union would have sufficient characteristics in common to facilitate the process. One of these characteristics was to have a sufficient degree of business cycle synchronization with other member States. As Eickmeier and Breitung (2006, page 539, line 10) argue, *"If business cycles are not synchronized among countries, possibly as a result of asymmetric shocks or differences in the transmission of common shocks due to differences in economic structures and policies, forming a monetary union could be costly ..."*. In our opinion, this synchronization would be facilitated by prior convergence in firms' financial structures. Our results show that such convergence has not yet been achieved, especially in the areas of productivity and indebtedness. The countries analysed should, therefore, seek to improve their legal and financial systems to achieve their objectives.

The rest of this paper is organized as follows. Section 2 describes the data utilised in the study; section 3 presents the Dynamic Factor Analysis performed; section 4 presents the results obtained and, finally, we discuss our conclusions in section 5. A mathematical appendix describing the estimation procedure is included.

2. DATA

The information utilized in this study is drawn from the AMADEUS data base, a pan-European database containing financial information on European companies. AMADEUS contains harmonized annual financial figures for firms in the 25 member States of the 2004 European Union. This data base contains information on over 140,000 large firms for the years from 1998 to 2004. AMADEUS has improved its extensive coverage of firms over this period, which also coincides with the privatisation processes undertaken by the new member States in the early 1990s. We include only large privately owned firms in this analysis, because AMADEUS' coverage of small and medium sized firms in central and Eastern Europe varies depending on country-level filing requirements.

The database contains 95% of all companies in each country complying with one of the following inclusion criteria: a) operating revenue equal to at least €15 million for UK, Germany, France Italy and Spain, and equal to at least €10 million for all other countries; b) total assets equal to at least €30 million for the former countries and equal to at least €20 million for all other countries; and c) number of employees equal to at least 200 for the four countries mentioned and equal to at least 150 for all other countries. The number of firms analysed in each country and certain key figures with regard to size are presented in Table 1.

We take into account all sectors except Financial Intermediation (classification "J" in NACE).

While Financial Reporting Standards differ between EU countries, uniformity is achieved by standardization of accounting information enabling easy cross-border analysis. The standardized data is received from a number of providers across Europe, allowing us to use information about both the EU15 and the 8 CEEN. The local source for this data is the local companies register, which requires all firms to submit annual filings. The database includes firm-level accounting data in standardized financial format comprising 22 balance sheet items and 22 income statement items, as well as ratios and other financial profiles. We construct our own ratios from the standardized items from the balance sheet and income statement.

TABLE 1. DESCRIPTION OF THE FIRMS

Country	Number of firms	Mean Turnover (thousand of €)	Mean Assets (thousand of €)
Cezch	4,289	37,495.62	34,068.71
Estonia	583	30,526.80	27,657.19
Hungary	2,052	81,164.82	45,881.95
Latvia	612	19,937.26	16,317.40
Lithuania	745	23,173.60	23,231.81
Poland	6,570	43,256.83	38,580.35
Slovak rep	1,041	42,233.85	40,118.52
Slovenia	506	62,416.98	78,004.68
UE 15	123,970	180,172.28	223,579.35
Total	140,368		

Table 2 defines the ratios employed, which are those used by the European Commission's Directorate-General for Economic and Financial Affairs in its Annual Report on the Financial Situation of European Enterprises. The ratios measure various matters related with firms' activities, such as returns (ratios R1 to R3), the cost of debt (ratios R4 to R5), productivity (ratios R6 to R9), and the level and structure of indebtedness (ratios R10 to R12).

In choosing this group of ratios, our intention was to analyse the same financial variables as the EU for studies of a similar nature published on a regular basis in order to obtain results on the convergence of business structures as a result of the development of the single market. We also considered the best approach would be to use a set of ratios that had been tested in earlier research focusing on the financial aspects of European convergence, which we considered the best approach.

Table 2. Ratios Analysed

Ratio	Denomination	Meaning
R1	(Return on Assets, ROA)	EBIT to total assets
R2	(Return on sales, ROS)	EBIT to net sales
R3	(Return on equity, ROE)	Profit or loss for the financial yearto equity capital
R4	(Relative Share of Financial Charges)	Financial charges on net turnover
R5	(Apparent Rate of Interest on Financial Debt)	Ratio of interest charges to debt owed to credit institutions
R6	(Value Added Ratio, VAR)	Value added (operating income - cost of materials) to net sales
R7	(Relative Share of Purchases)	Consumption of goods and services to net sales
R8	(Relative Share of Staff Costs)	Staff costs to net sales
R9	(Staff Costs Relative to Value Added)	Staff costs to value added (operating income - cost of materials)
R10	(Gearing)	Ratio of long + short-term debt to total assets
R11	(Financial Indebtedness)	Ratio of financial debt to total balance
R12	(Debt Structure)	Ratio of total non current liabilities to total debt

Source: European Commission (2001).

Existing papers show that these ratios are key indicators for the evolution of industrial firms (see European Commission, 1995, 1997, 1998 and 2001). Furthermore, a similar group of ratios has been utilized in multivariate studies of the European economy based on the analysis of financial statements (Gallizo and Salvador, 2002; Serrano, et al 2002, 2005) and has served as the basis for comparison between the financial structures of SMEs and large firms in the EU (Rivaud-Danset, et al, 2001, 2005).

The data selected comprise average financial ratios values for each of the new Central and Eastern European members States (i.e. excluding Malta and Cyprus) in each year. These values were calculated by aggregating the various lines of the balance sheet for firms in each country and year based on the figures obtained from the AMADEUS data base. Table 3 shows the period analysed for each country and each ratio. As may be observed from the Table, certain data are missing for various ratios and countries. Thus, no reliable information was available in the case of Hungary to obtain the cost of goods sold and the cost of employees, necessary for the calculation of ratios R6 to R9. In the cases of Lithuania, Slovenia and Slovakia, meanwhile, no breakdowns of expenses (financial expenses, cost of goods sold and employee cost) were available. Finally, there was no detailed data on the structure of debt for Slovenia (see table 3).

The existence of missing data and the relative scarcity of data for the series and countries considered means a classic analysis of observed data based on asymptotic results would be difficult to justify, if not impossible, in this context. To solve this problem, we have adopted a statistical Bayesian methodology, which is described in the following section.

3. DYNAMIC FACTOR ANALYSIS

This section presents the model employed to analyse the convergence of firms' financial structures through an analysis of the overall evolution of financial ratios. To this end, we shall perform a dynamic analysis of deviations in the ratios for each country as compared to the average values in the countries of the EU-15, seeking to establish the common factors underlying developments, which will allow us to describe the situation in more parsimonious and intelligible terms. The statistical Bayesian methodology used to estimate the parameters of the model is also briefly described. Mathematical details are given in the appendix.

3.1. Setting-up the problem

Let $\{R_i;\ i = 1,\dots, p\}$ the financial ratios analysed, N the number of countries and T the length of the period considered in the study.

Our data set is given by
$\{d^j_{i,t} = R^j_{i,t} - R^{EU}_{i,t};\ t = t^j_{min,i},\dots,t^j_{max,i};\ j \in J_i \subseteq \{1,\dots,N\}\ i = 1,\dots,p\}$

where
$R^j_{i,t}$ = value of the ratio R_i corresponding to the j^{th} country in the period t[1]
$R^{EU}_{i,t}$ = value of ratio R_i corresponding to the EU firms in the period t
J_i is the set of countries with observed data of the ratio R_i
$T_{i,j} = \{t^j_{min,i},\dots,t^j_{min,i} + 1,\dots, t^j_{max,i}\}$ with $1 \le t^j_{min,i} < t^j_{max,i} \le T$ is the observation's period of ratio R_i corresponding to the j^{th} country

1. In the case of ratios R4 to R9 and R11 to R14 we transform logarithmically in order to increase their normality degree.

In our case p = 14, N = 8 (Cezch, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) and T = 7 corresponding t = 1 to year 1998, t = 2 to year 1999 and so on.

3.2. The model

Our model is a Dynamic Factor Analysis Model with K factors given by:

$$d^j_{i,t} = \alpha_i + \beta_i f^j_{k,t} + \varepsilon^j_{i,t} \text{ with } \varepsilon^j_{i,t} \sim N\left(0, \sigma^2_{d,i}\right) \tag{3.1}$$

$i \in I_k = \{i_{k,1} < \ldots < i_{k,p_k}\} \subseteq \{1,\ldots,p\}$; $j \in J_i \subseteq \{1,\ldots,N\}$; $k=1,\ldots,K$

$f^j_{k,t} = f^j_{k,t-1} + u^j_{k,t}$ with $u^j_{k,t} \sim N(0,(\sigma^j_{f,k})^2)$; $t=2,\ldots,T$

$$f^j_{k,1} \sim N(0,1); \; j \in JF_k = \bigcup_{i \in I_k} J_i \subseteq \{1,\ldots,N\} \tag{3.2}$$

where:

β_i is the factor loading of the ratio R_i with respect to the factor F_k
$f^j_{k,t}$ is the k^{th} factor score of the jth country in the period t
$\alpha_i + \beta_i f^j_{k,t}$ is the trend of the deviation $D_i = R_i - R_i^{UE}$ for the country j in the period t
I_k is the set of ratios related to the kth factor
JF_k is the set of countries with observed data in some of the ratios R_i related to the k^{th} factor

Furthermore, and in order to avoid identifiability problems in the estimation of the parameters, we will take $\beta_{i_{k,1}}=1$ $\forall k=1,\ldots, K$.

The factor scores $\{f^j_{k,t}$; t=1, ..., T; $j \in JF_K\}$ reflect the common trends of the deviations $\{D_i;\ i \in I_k\}$ for each country and period in relation to the financial ratios related to the kth factor. The trends for these deviations are estimated on this basis for each country and period using the expressions $\{\alpha_i + \beta_i f^j_{k,t};\ t=1,\ldots,T;\ j \in JF_k;\ i \in I_k\}$.

Given the small sample size available by series (7 data for the larger series) and the existence of different observation periods for each country and ratio, we use a Bayesian approach to estimate the parameters of the model, allowing us to make exact inferences using MCMC methods (see appendix for details).

Table 3. Period analysed for each country and each ratio

Ratio/ Country	Cezch	Estonia	Hungary	Latvia	Lithuania	Poland	Slovenia	Slovakia
R1	98-04	98-04	98-04	98-04	98-04	98-04	98-04	98-04
R2	98-04	98-03	98-04	98-04	98-04	98-04	98-04	-
R3	98-04	98-04	98-04	98-04	98-04	98-04	98-04	98-04
R4	98-04	98-03	98-04	00-04	-	98-04	98-04	98-04
R5	98-04	98-03	98-04	00-04	-	98-04	-	98-03
R6	98-04	98-04	-	98-04	98-04	98-04	98-04	98-04
R7	98-04	98-04	-	98-04	98-04	98-04	98-04	98-04
R8	98-04	98-03	-	98-04	98-04	98-04	-	98-03
R9	98-04	98-03	-	98-04	98-04	98-04	98-04	-
R10	98-04	98-04	98-04	98-04	98-04	98-04	-	98-04
R11	98-04	98-04	98-04	98-04	98-04	98-04	-	98-04
R12	98-04	98-04	98-04	98-04	98-04	98-04	-	98-04

4. RESULTS

Figure 1 shows the evolution of the average values of the ratios analysed for the European Union countries. Based on this analysis, we may observe, in particular, that returns fell (ratios R1 to R3), the cost of debt increased (ratios R4 and R5) and productivity declined (ratios R6 to R9) in European Union firms in 2001 and 2002, with recovery following in 2003. These dips were basically a consequence of the economic slowdown caused by the decline in sales of European industrial concerns, which involved a deceleration in exports and rising prices for goods and services. (European Commission, 2005a). Likewise, a clear upward trend is apparent in the level of indebtedness among firms in the European Union (ratio 10), in line with falling interest rates in the period analysed.

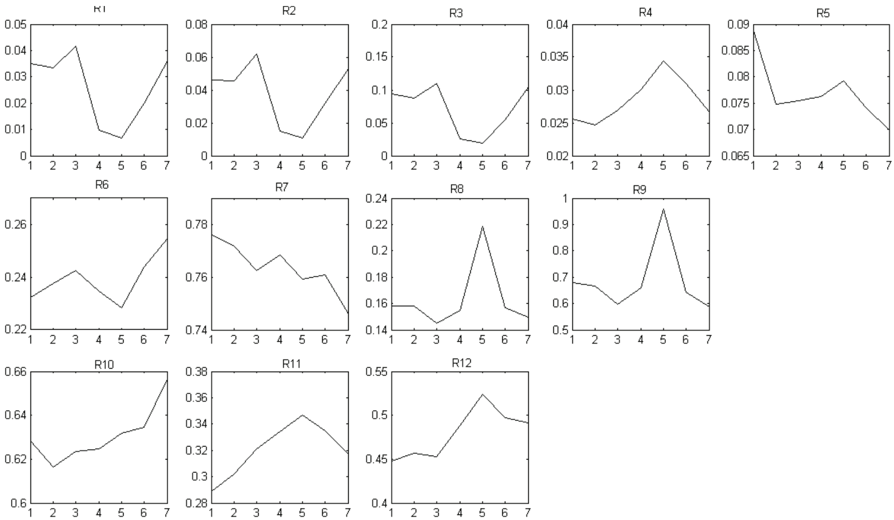

Figure 1. Dynamic evolution of the average financial ratios of the European Union firm's (t = 1 corresponds to year 1998, t = 2 to year 1999 and so on).

An exploratory factor analysis of the ratios analysed revealed the existence of three factors related to the Return vs. the Cost of Debt (ratios R1 to R5), Productivity (ratios R6 to R9) and Indebtedness (ratios R10 a R12) of the firms, which explain around 75% of the total variation (Gallizo et al, 2008). For this reason we take K = 3 and, in order to avoid identifiability problems we take the factor loadings ratios R1, R6 and R10 equal to 1. Table 4 shows the estimated values of the parameters ai, bi and sd,i, the ratios related with each factor and the expected sign of the factor loadings bi, which coincide with the sign of the estimated coefficients. Meanwhile, Figures 2, 4 and 6 show the point estimations and the 95% Bayesian credibility intervals corresponding to the factorial scores $\{f^j_{k,t};\ j \in JF_k;\ t=1,\ldots,T\}$ of each country for each year and factor, and Figures 3, 5 and 7 show the estimated trend of the financial ratios deviations related to each factor and country, together with the 95% Bayesian credibility intervals calculated using the procedure described in the Appendix.

4.1. Returns versus cost of debt opposing

As may be observed (see Table 4), the first factor has positive factor loadings βi with ratios for returns (R1, R2 and R3) and negative factor loadings βi with ratios measuring the cost of debt (R4 and R5). Essentially it contrasts the evolution of these two groups of ratios, capturing their divergent behaviour. It thus reflects the inverse relationship between the returns generated by enterprises and the cost of borrowing in terms of financial charges, explaining how rising returns are accompanied by a reduction in firms' financial expenses.

Analysing the estimated values of the factor scores (see Figure 2) and the trends for ratios R1 to R5 (see Figure 3), we may observe that the crisis in the business cycle that firms in the EU-15 underwent between 2001-2002 was not felt in the candidate countries, whose firms were enjoying positive growth in returns (see Figure 3), as they had done since the transition, while national economies expanded (European Commission, 2004). Furthermore, the ratios of CEEN firms had to some extent closed the gap with the values found in the Union European countries by the end of the period. Clearly, the downward trend in interest rates in international markets in the first years of the 21st century resulted in a reduction in financial costs from which the CEEN countries also benefited. Hence, returns improved towards the levels of their European partners (see table 4).

The only exceptions to this general movement are Estonia and Polonia. Estonia is a country in which the Return vs. Cost of Debt factor scores positively at the end of the period (see Figure 2) due to the higher returns generated by its enterprises (see Figure 3). In this regard, Estonia's strong economic situation from 2001 to 2004 period should not be forgotten. Thus, the economic framework within which its enterprises have developed was extremely favourable, combining price stability (2% in 2004) with considerable growth (3% in 2004) and a low level of public debt (5.3% in 2004), allowing returns to grow faster than the average for the countries European partners.

In Polish firms, we may observe that that returns and borrowing costs were respectively lower and higher than in firms resident in the EU-15, but by 2004 levels similar to those found in the EU-15 had been achieved. Meanwhile, the evolution of the Return vs. Cost of Debt was positive throughout the period analysed. These developments are related with the higher levels of trade payables found on the balance sheets of Polish concerns, which freed them from total dependence on borrowings to finance the operating cycle. This cost-free debt lowered financial expenses in relation to profits to levels similar to those found in the EU at the end of the period analysed.

Table 4. Posterior estimation of α_i, β_i and $\sigma_{d,i}$

			α_i			β_i			$\sigma_{d,i}$		
Ratio	**Factor**	**Expected sign of Beta**	**Q2.5**	**Median**	**Q97.5**	**Q2.5**	**Median**	**Q97.5**	**Q2.5**	**Median**	**Q97.5**
R1	Return vs Cost of Debt	+	-0.0113	-0.0082	-0.0051	1.0000	1.0000	1.0000	0.0090	0.0118	0.0154
R2	Return vs Cost of Debt	+	-0.0261	-0.0217	-0.0172	0.7606	0.8707	0.9874	0.0081	0.0105	0.0132
R3	Return vs Cost of Debt	+	-0.0456	-0.0376	-0.0295	1.7647	1.9740	2.1787	0.0055	0.0113	0.0184
R4	Return vs Cost of Debt	-	0.0823	0.2351	0.3878	-13.5545	-9.3898	-5.3495	0.0067	0.0541	0.2848
R5	Return vs Cost of Debt	-	0.3976	0.4986	0.6010	-5.4700	-2.5718	-0.2979	0.4381	0.5308	0.6697
R6	Productivity	+	-0.6107	-0.5188	-0.4058	1.0000	1.0000	1.0000	0.2920	0.3664	0.4686
R7	Productivity	-	0.0341	0.0519	0.0807	-0.2222	-0.1620	-0.1093	0.0369	0.0543	0.0715
R8	Productivity	-	-0.2451	-0.1790	-0.0961	-0.6327	-0.4250	-0.2029	0.1813	0.2309	0.3134
R9	Productivity	-	-0.0082	0.0113	0.1807	-1.3295	-1.0821	-0.8221	0.0070	0.0478	0.2807
R10	Indebtedness	+	-0.2962	-0.2807	-0.2583	1.0000	1.0000	1.0000	0.0123	0.0544	0.1314
R11	Indebtedness	+	-0.3583	-0.2962	-0.2346	0.0057	0.1214	0.4929	0.1842	0.2261	0.2873
R12	Indebtedness	+	-0.2353	-0.1679	-0.1004	0.0053	0.1245	0.5157	0.2032	0.2469	0.3061

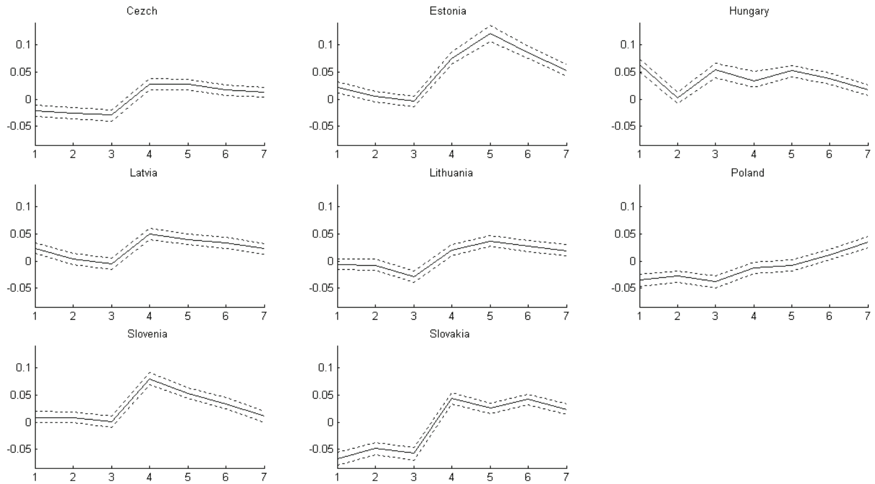

Figure 2: point estimations (continuous line) and bayesian 95% credibility intervals (dotted lines) of the evolution of the scores of the return vs cost of debt factor for each country.

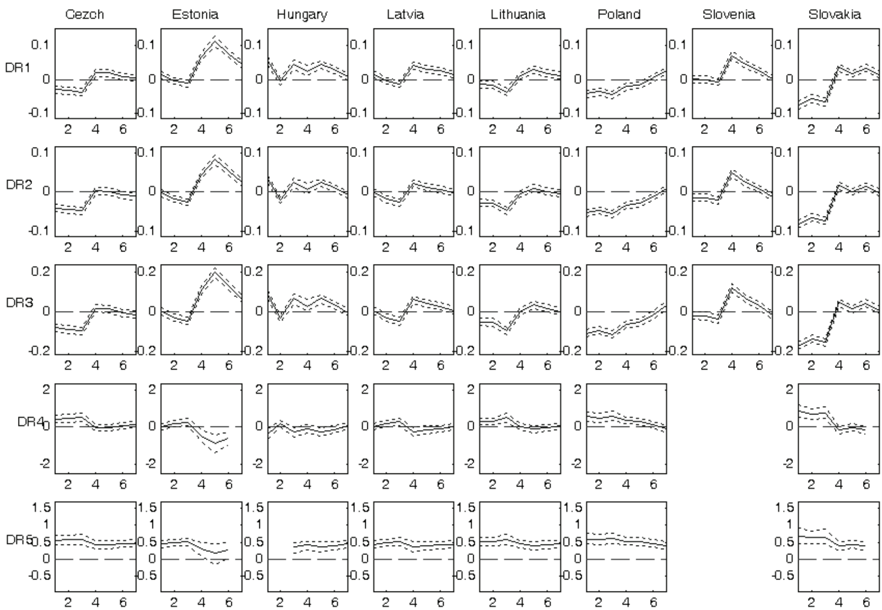

Figure 3. Estimated trend (continuous line) and 95% credibility Bayes intervals limits (dotted lines) of the evolution of financial ratios related to the Return vs Cost of Debt Factor with respect to the EU-15 firms (the zero value dashed line shows the position of the average ratio of the EU-15).

4.2. Productivity

The second factor is directly related to the ratio R6 and inversely related with ratios R7, R8 and R9 (see the signs of the β_i coefficients in Table 4). This factor basically measures the level of productivity in the enterprises of the country in question, contrasting sales with the costs incurred to obtain them (consumption of goods and services, and personnel expenses). This factor therefore compares productivity gains in the use of materials and services in manufacturing and sales processes, which are usually accompanied by falls in personnel expenses as a percentage of sales.

The evolution of the Productivity factor remained practically constant throughout the period in the majority of the countries analysed (see Figure 4), with Poland (after 1999) and Latvia outperforming the EU-15, mainly due to lower personnel costs (see Figure 5 ratio R8). Meanwhile, the productivity Estonian and Lithuanian was lower than in the EU-15 because of lower ratios for value added (R6) and higher ratios for consumption of goods and services (R7) (see Figure 5). In general, real differences in labour productivity between the countries have remained stable over time. This is due to structural conditions in the local markets, which feature high levels of unemployment and low wages, and more rigid labour legislation, which prevents flexible responses by firms in their efforts to adapt costs to levels of production.

Furthermore, a small spike is also observable in 2002, due to the fall in productivity in EU-15 firms, as mentioned above (see Figure 1, ratios R6, R8 and R9).

The Czech Republic, Slovakia and Slovenia represent exceptions to the general pattern. Productivity declined in the Czech Republic in the period 2002-2004 with a downward trend in the value added ratio (see ratio R6 in Figure 5) and an increasing trend in personnel costs and higher consumption of goods and services (ratios R7 to R9, see Figure 5). In Slovenia, meanwhile, an upward trend is observable over the period 1998-2002 followed by a downward trend beginning in 2003. Finally, Slovakia exhibits an upward trend with higher productivity than in the EU-15 throughout the period analysed.

In this light, the growth in real wages seen in all CEEN countries in the latter years of the study does not threaten the development of enterprise in the majority of the countries analysed, because it has been offset by an equivalent increment in the generation of value added and, consequently, labour productivity remains grossly constant. These developments exemplify the adaptability of government policy making. For example, employment rose in Slovakia from 2003 onwards due to reforms making wage settlements more flexible and reducing the social charges payable by firms. Furthermore, convergence in labour productivity has been supported by a swift transition towards the knowledge-based society and the expansion of information technologies (European Commission, 2005b).

In the Czech Republic, on the other hand, productivity declined in the last three years of the study as a result of the increase in the purchases and personnel costs ratios. In this case, the government found itself obliged to implement urgent measures to reform labour legislation and the education system, basically to create more flexible contracts and improve employee training, as well as measures to support SDI, including incentives for investment in fixed assets, all of which, it is hoped, will have a medium term effect on corporate results (European Commission, 2005a).

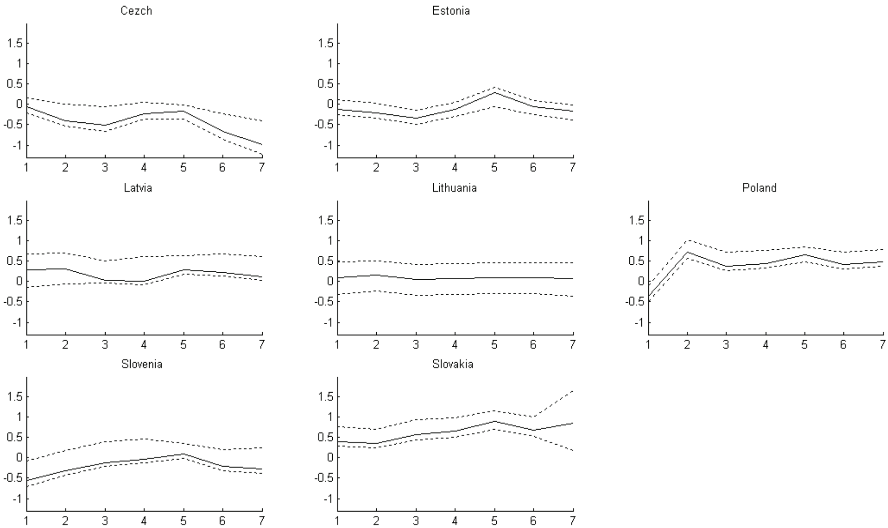

Figure 4. Point estimations (continuous line) and Bayesian 95% credibility intervals (dotted lines) of the evolution of the scores of the Productivit factor for each country.

As a consequence of the above, there has been no clear convergence of the new member States with the EU-15 in terms of productivity (see Figure 4). Rather the relative positions of each country have stayed more or less the same with the exceptions of the Czech Republic, Slovakia and Slovenia, which tended to diverge from the EU-15 in the years immediately after 2002 for the reasons outlined above. Only Lithuania exhibits an evolution that is similar to that of the European Union, where the trajectory is a continuation of the trend in prior years.

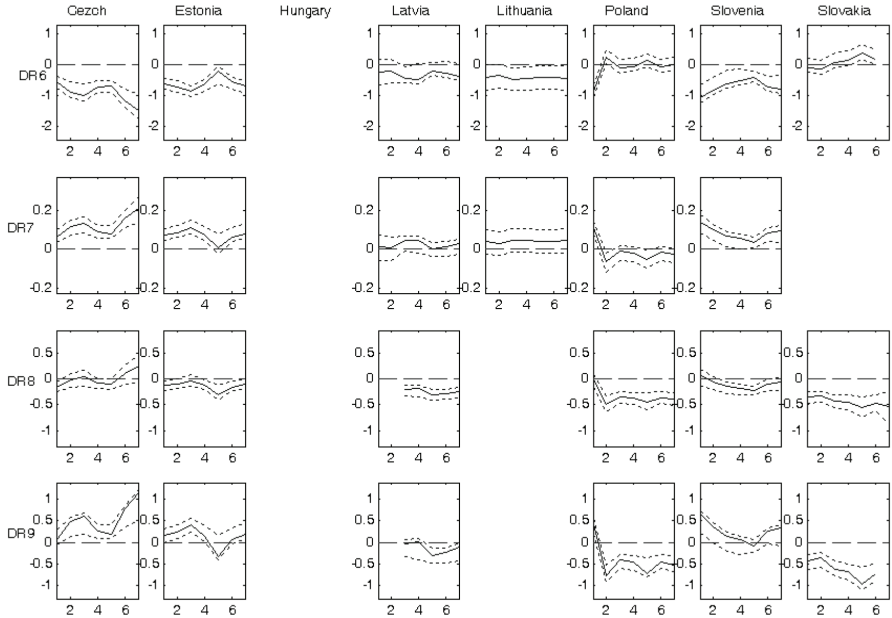

Figure 5. Estimated trend (continuous line) and 95% credibility Bayes intervals limits (dotted lines) of the evolution of the financial ratios related to the Productivity Factor with respect to the EU-15 firms (the zero value dashed line shows the position of the average ratio of the EU-15).

4.3. Indebtedness

The third factor is positively related to the indebtedness ratios R10, R11 and R12 (see the positive signs of the β_i coefficients in Table 4) and measures the level of indebtedness, which is of particular interest for the identification of stable differences in the internal country patterns that determine firms' capital structures. The evolution of this factor remains grossly constant trend in the majority of countries over the period 1998-2002 with a downward trend thereafter (see Figure 6), due mainly to the sharp increase in the gearing ratio (R10) in EU-15 firms (see Figure 1). Furthermore, the level of the indebtedness ratios tends to be lower than the average values of EU-15 firms for all of the countries analysed (see Figure 7), reflecting the high levels of debt maintained by EU-15 firms in the period considered. This lower level in indebtedness in the CEEN countries is due mainly to foreign direct investment and the small size of their financial systems.

The only exception to this pattern is Slovenia, where a clear upward trend in indebtedness may be observed (see Ratio R10 in Figure 7), partly because interest rates fell more quickly in this country than in the other members of its peer group. (see figures 6 and 7).

As a result, not only is there no observable convergence with the EU-15, but rather the reverse. The trend is in fact increasingly divergent in the last years of the period (see Figure 7). There are several reasons for this pattern. On the one hand, the evolution of the financial structure of firms in the new EU member States is conditioned by foreign investment, while on the other it is closely linked to the characteristics of local banking systems, influencing the distribution of financial resources during the period of the study. Foreign investment has made strategic restructuring possible and boosted production capacity, generating growth in both sales and earnings that could not have been achieved if firms were able to rely only on domestic capital (Kocenda and Svejnar, 2003). Furthermore, the debt markets are still only embryonic. This means that collective investment barely exists and the financial system is based mainly on State-owned banks, preventing faster development. Nevertheless, foreign capital has taken positions in recent years, which points to new opportunities for expansion and business growth. All of the above explains the divergence found in the indebtedness factor between the CEEN countries and the EU-15 group, where the financial system is stable and well developed to fund enterprise growth.

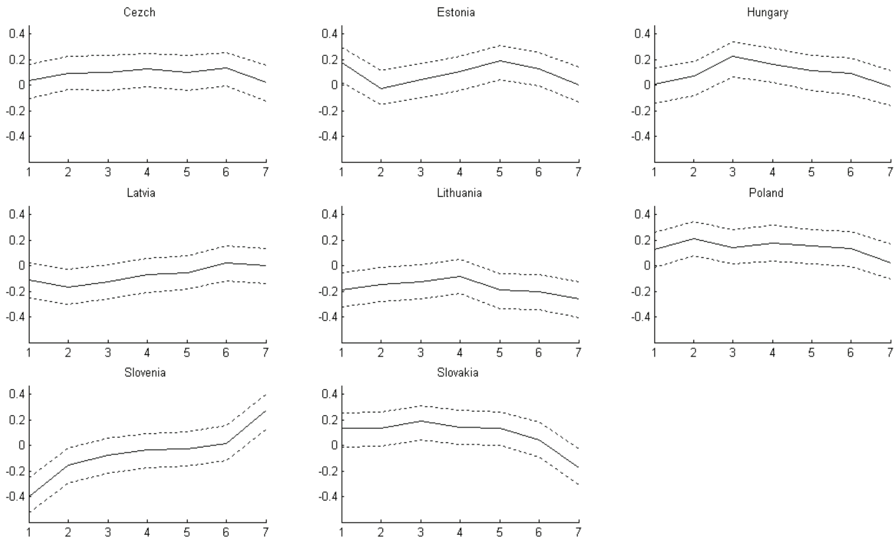

Figure 6. Point estimations (continuous line) and Bayesian 95% credibility intervals (dashed lines) of the evolution of the scores of the Indebtedness factor for each country.

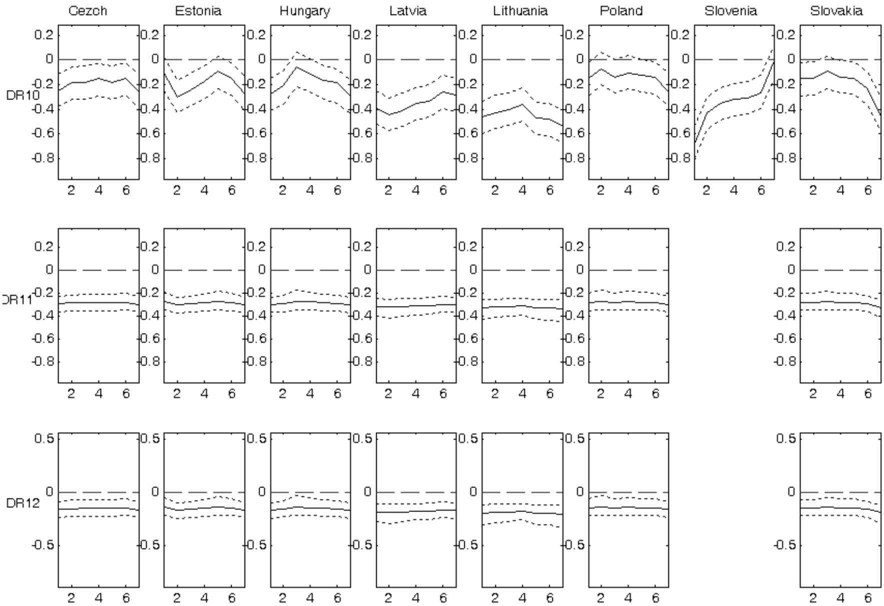

Figure 7. Estimated trend (continuous line) and 95% credibility Bayes intervals limits (dotted lines) of the evolution of the financial ratios related to the Indebtedness Factor with respect to the EU-15 firms (the zero value dashed line shows the position of the average ratio of the EU-15).

4.4. Goodness of fit of the model

Figures 8 to 10 provide a graphical analysis of the goodness of fit of the model to the observed data. In these Figures the observed dynamic evolution of the financial ratios is compared to their predicted values $E[d^j_{i,t}|\text{Data}]$ and the 95% Bayesian forecasting intervals one-step ahead using the procedure described in the Appendix. We may note here that the goodness of fit of the model is adequate for the majority of countries and ratios analysed with an empirical coverage of the above intervals equal to 96.91% (the coverage of the 99% intervals was equal to 99.14%).

More general models allowing the assumption that the factor scores follow an AR(1) procedure were estimated, but they do not significantly improve the results obtained.

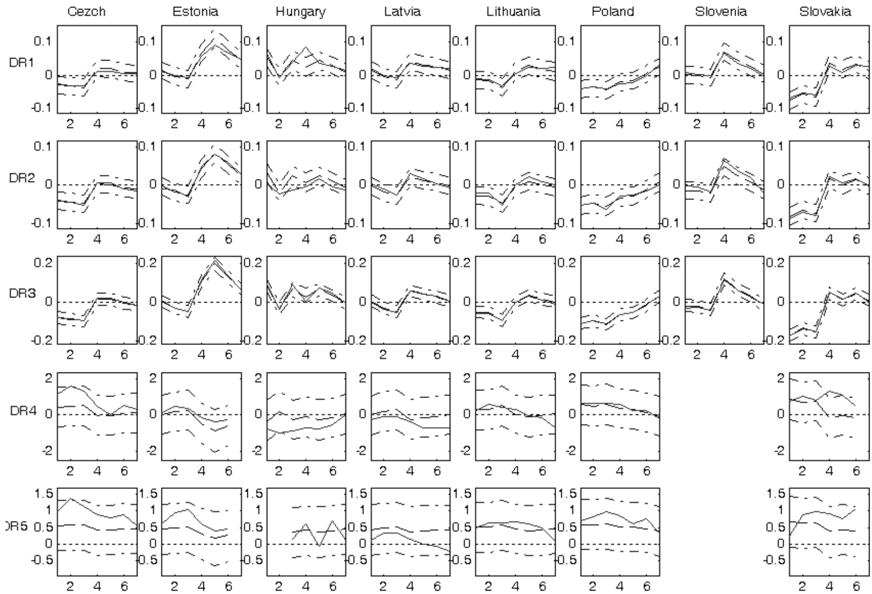

Figure 8. Dynamic evolution of the financial ratios related to the Return vs Cost of Debt Factor Continuous line: observed ratio; Dashed line: estimated trend; Dotted and dashed lines: 95% credibility Bayes intervals limits (the zero value dotted line shows the position of the average ratio of the EU-15).

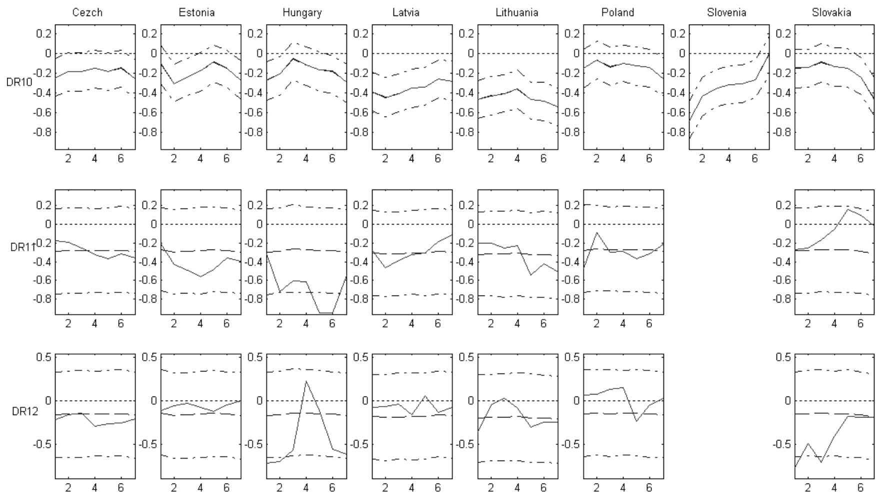

Figure 10. Dynamic evolution of the financial ratios related to the Indebtedness Factor Continuous line: observed ratio; Dashed line: estimated trend; Dotted and dashed lines: 95% credibility Bayes intervals limits (the zero value dotted line shows the position of the average ratio of the EU-15).

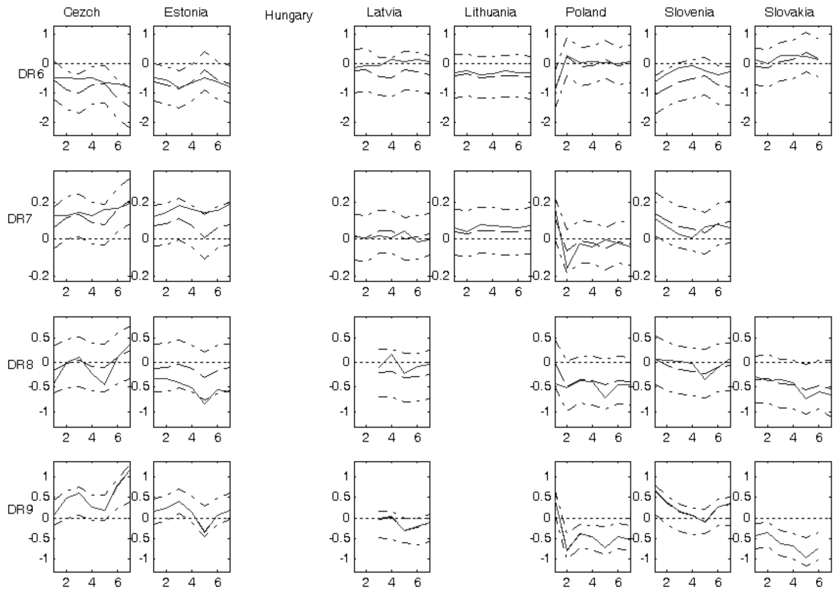

Figure 9. Dynamic evolution of the financial ratios related to the Productivity Factor Continuous line: observed ratio; Dashed line: estimated trend; Dotted and dashed lines: 95% credibility Bayes intervals limits (the zero value dotted line shows the position of the average ratio of the EU-15).

5. CONCLUSIONS

The enlargement of the European Union in May 2004 embracing eight new Central and Eastern European nations, Malta and Cyprus brought a significant contingent of firms into competition in the Single European Market under similar conditions to the enterprises of the existing member States. This paper has sought to discover whether the new partners have succeeded in making a harmonious transition, expressed in terms of the structure of their financial statements, over the period of the study, which begins with the consolidation of the privatisation process affecting State-owned enterprises (1998) and continues through to the moment at which the CEEN countries actually joined the EU (2004). We have also investigated whether European aid and the economic policies followed by the respective governments have helped to generate convergence in the main financial measures.

To this end, we performed a Dynamic Factor Analysis of financial ratios related to firms' returns, cost of debt, productivity and indebtedness in order to capture the patterns of simultaneous evolution over the period considered. Analysing the evolution of these ratios, we were able to observe the presence of convergence in returns and cost of debt, with a clear trend towards an increase in profitability and a reduction in financial expenses after 2002. No convergence was found for the ratios related to the productivity and indebtedness factors.

The evolution of the Productivity factor remained practically constant throughout the period in the majority of the countries analysed. In general, real differences in labour productivity between the countries have been maintained over time. This is due to structural conditions in the local markets, which feature high levels of unemployment and low wages, as well as more rigid legislation which prevents flexible responses by firms in their efforts to adapt costs to levels of production.

No convergence was observed for the indebtedness factor over the period considered. However, the beginnings of a possible process of divergence may be observed at the end of the period due to the arrival of foreign capital, encouraged by the outlook for the CEEN countries upon joining the EU and by the limited development of the banking industry and financial sector legislation. Foreign investment is, moreover, highly likely to continue while the new member States remain stable and go on growing. Nevertheless, any change in circumstances could reduce the inflow of foreign investment with the result that business expansion would have to be funded out of local lending, which would impact corporate results and lead to a narrowing of the gap in the financial variables considered in this study.

While no convergence between the economic and financial structures of companies in the CEEN and those in the EU-15 is observable in the ratios analysed taken as a whole, changes in employment and productivity structures could point to increased participation by CEEN firms in the wider European economy, despite differences in convergence, and, therefore, to the possibility of future convergence in the countries' main financial indicators.

APPENDIX

This appendix describes the Bayesian estimation procedure of the parameters of the model (3.1)-(3.2) used in the study. In what follows [X] and [X|Y] will denote the density and the conditional density of the random variables X and X|Y, respectively.

Given that we use a Bayesian approach we start giving the prior distribution

A.1. Prior distribution

It is given by:

$$\alpha_i \sim N\left(0, s_\alpha^2\right) \text{; i=1,...,p} \qquad \text{(A.1)}$$

$\beta_i \sim N(0,1)\ i \in \{1,\ldots,p\}-\{i_{1,1}, \ldots, i_{K,1}\}$ (A.2)

$$\tau_{d,i} = \frac{1}{\sigma^2_{d,i}} \sim \text{Gamma}\left(\frac{n_d}{2}, \frac{n_d s^2_d}{2}\right);\ i=1,\ldots,p \tag{A.3}$$

$$\tau^j_{f,k} = \frac{1}{\left(\sigma^j_{f,k}\right)^2} \sim \text{Gamma}\left(\frac{n_f}{2}, \frac{n_f s^2_f}{2}\right);\ k=1,\ldots,K;\ j=1,\ldots,N \tag{A.4}$$

where $S_\alpha^2 > 0$, $n_d > 0$, $S_d^2 > 0$, $n_f > 0$, $S_f^2 > 0$ are know constants and (A.1)-(A.4) are assumed to be independent one each other. These prior distributions are standard in the literature and we have taken $S_\alpha^2 = 100$, $n_d = S_d^2 = 0.01$, $n_f = S_f^2 = 1$ in order to have fairly non-informative distributions. A sensitivity study with respect the values of these hyperparameters did not reveal significant differences with respect the results obtained.

A.2. Posterior distribution

In order to estimate the parameters of the model it is necessary to calculate their posterior distribution.

Let $\theta = (\alpha', \beta', \tau'_d, \tau'_f, f')'$ the vector of parameters of the model where
$\alpha = (\alpha_i;\ i=1,\ldots,p;)'$
$\beta = (\beta_i;\ i \in C = \{1,\ldots,p\}-\{i_{1,1}, \ldots, i_{K,1}\})'$
$\tau_d = (\tau_{d,i};\ i=1,\ldots, p)'$
$\tau_f = (\tau^j_{f,k};K=1,\ldots,K;\ j=1,\ldots,N)'$
$f = \text{vec}\,(f^j_{k,t};k=1,\ldots,K;\ j=1,\ldots,N;\ t=1,\ldots,T)$

Applying the Bayes Theorem, the posterior distribution of θ will be given by:

$$[\theta \mid \text{Data}] \propto \prod_{k=1}^{K}\prod_{i\in I_k}\prod_{j\in J_I}\prod_{t\in T_{i,j}}\left[d^j_{i,t} \mid \alpha_i, \beta_i, f^j_{k,t}, \tau_{d,i}\right]\prod_{k=1}^{K}\prod_{j=1}^{N}\left\{\prod_{t=2}^{T}\left[f^j_{k,t} \mid f^j_{k,t-1}, \tau^j_{f,k}\right]\right\}\left[f^j_{k,1}\right]$$

$$\prod_{i=1}^{p}\left[\alpha_i\right]\prod_{i\in C}\left[\beta_i\right]\prod_{i=1}^{p}\left[\tau_{d,i}\right]\prod_{k=1}^{K}\prod_{j=1}^{J}\left[\tau^j_{f,k}\right] \propto$$

$$\prod_{k=1}^{K}\prod_{i\in I_k}\prod_{j\in J_i}\prod_{t\in T_{i,j}}\tau^{\frac{1}{2}}_{d,i}\exp\left[-\frac{\tau_{d,i}}{2}\left(d^j_{i,t} - \alpha_i - \beta_i f^j_{k,t}\right)^2\right]$$

$$\prod_{k=1}^{K}\prod_{j\in JF_k}\left\{\left\{\prod_{t=2}^{T}\left(\tau^{j}_{f,k}\right)^{\frac{1}{2}}\exp\left[-\frac{\tau^{j}_{f,k}}{2}\left(f^{j}_{k,t}-f^{j}_{k,t-1}\right)^{2}\right]\right\}\exp\left[-\frac{1}{2}\left(f^{j}_{k,1}\right)^{2}\right]\right\}$$

$$\prod_{i=1}^{p}\exp\left[-\frac{1}{2s^{2}_{\alpha}}\alpha^{2}_{i}\right]\prod_{i\in C}\exp\left[-\frac{1}{2}\beta^{2}_{i}\right]\prod_{i=1}^{p}\tau_{d,i}^{\frac{n_d}{2}-1}\exp\left[-\frac{n_d s^{2}_{d}}{2}\tau_{d,i}\right]I_{(0,\infty)}\left(\tau_{d,i}\right)$$

$$\prod_{k=1}^{K}\prod_{j\in JF_k}\left(\tau^{j}_{f,k}\right)^{\frac{n_f}{2}-1}\exp\left[-\frac{n_f s^{2}_{f}}{2}\tau^{j}_{f,k}\right]I_{(0,\infty)}\left(\tau^{j}_{f,k}\right)$$

(A.5)

Given that (A.5) is not analytically tractable we use MCMC methods in order to calculate the marginal distributions of (A.5). More concretely, we use the Gibbs sampling. Next we describe the full conditional distributions of (A.5) which are necessary in order to implement it. All of them are standard.

A.3. Full conditional distributions of (A.5)

1. α_i |rest of parameters, Data = $\alpha_i \mid \tau_{d,i}$, ($f^{j}_{k,t}$; $t \in T_{i,j}$, $j \in J_i$), ($d^{j}_{k,t}$; $t \in T_{i,j}$, $j \in J_i$) ~ $N(m_{\alpha,i}, s^{2}_{\alpha,i})$ for $i \notin C$ where

$$m_{\alpha,i}=\frac{\tau_{d,i}\sum_{j\in J_i}\sum_{t\in T_{i,j}}\left(d^{j}_{i,t}-f^{j}_{k,t}\right)}{\tau_{\alpha}+\tau_{d,i}\sum_{j\in J_i}\left|T_{i,j}\right|}\ ,\ i\in I_k$$

$$s^{2}_{\alpha,i}=\frac{1}{\tau_{\alpha}+\tau_{d,i}\sum_{j\in J_i}\left|T_{i,j}\right|}\ \text{where}\ \tau_{\alpha}=\frac{1}{s^{2}_{\alpha}}$$

2. $(\alpha_i, \beta_i)'$ | rest of parameters, Data = $(\alpha_i,\beta_i)' \mid \tau_{d,i}$, ($f^{j}_{k,t}$; $t \in T_{i,j}$, $j \in J_i$), ($d^{j}_{k,t}$; $t \in T_{i,j}$, $j \in J_i$)
$N(m_{\alpha,i}, s^{2}_{\alpha,i})$ ~ ; $i \in C \cap I_k$ with

$$\mathbf{S}^{-1}_{\alpha,\beta,i}=\begin{pmatrix}\tau_{\alpha} & 0\\ 0 & 1\end{pmatrix}+\tau_{d,i}\begin{pmatrix}\sum_{j\in J_i}\left|T_{i,j}\right| & \sum_{j\in J_i}\sum_{t\in T_{i,j}}f^{j}_{k,t}\\ \sum_{j\in J_i}\sum_{t\in T_{i,j}}f^{j}_{k,t} & \sum_{j\in J_i}\sum_{t\in T_{i,j}}\left(f^{j}_{k,t}\right)^{2}\end{pmatrix}$$

$$m_{\alpha,\beta,i} = \tau_{d,i}\ \mathbf{S}_{\alpha,\beta,i}\left(\left(\begin{array}{c}\sum_{j\in J_i}\sum_{t\in T_{i,j}} d^j_{i,t}\\ \sum_{j\in J_i}\sum_{t\in T_{i,j}} d^j_{i,t} f^j_{k,t}\end{array}\right)\right)$$

3. $\tau_{d,i}$ | rest of parameters, Data = $\tau_{d,i}$ |α_i, β_i, ($f^j_{k,t}$; t ϵ $T_{i,j}$, j ϵ J_i), ($d^j_{k,t}$; t ϵ $T_{i,j}$, j ϵ J_i)

$$, \sim \text{Gamma}\left(\frac{n_d + \sum_{j\in J_i}\left|T_{i,j}\right|}{2}, \frac{n_d s_d^2 + \sum_{j\in J_i}\sum_{t\in T_{i,j}}\left(d^j_{i,t} - \alpha_i - \beta_i f^i_{k,t}\right)^2}{2}\right) ;i = 1,\ldots, p$$

4. $\mathbf{f}^j_k = \left(f^j_{k,1},\ldots,f^j_{k,T}\right)'$ | rest of parameters $=\ \mathbf{f}^j_k = \left(f^j_{k,1},\ldots,f^j_{k,T}\right)'$ | $\left(\alpha^j_i; i\in I_k\right), \left(\beta_i; i\in I_k\right), \sigma^2_{d,i}, \sigma^j_{f,k}$

In order to draw a sample from this distribution we consider the state-space model given by the equations:

$$d^j_{i,t}=\alpha^j_i + \beta_i f^j_{k,t} + \varepsilon^j_{i,t} \ \text{ with } \ \varepsilon^j_{i,t} \sim N\,(0, \sigma^2_{d,i});\ i \in I_k;\ j \in J_i$$

$$f^j_{k,t}=f^j_{k,\,t-1} + u^j_{k,t} \ \text{ with } \ u^j_{k,t} \sim N\,(0, (\sigma^j_{f,k})^2);\ t \in \{2,\ldots,T\}$$

$$f^j_{k,1} \sim N(0,1)$$

The sample is drawn by applying a forward-filtering and backward sampling algorithm (Carter and Kohn, 1994; Früchwirth-Schnatter, 1994) to the state-space model given by:

$$y_t = F_t\theta_t + v_t \text{ with } v_t \sim N_{|J|}(0,V_t)$$

$$\theta_t = \theta_{t-1} + w_t \text{ with } w_t \sim N(0,W_t)$$

$$\theta_0 \sim N(m_0,C_0)$$

where

$$y_t = \left(d^j_{i,t} - \alpha^j_i; i \in I_k\right)';$$

$$F_t = (\beta_i;\ i \in I_k)';\ \theta_t = f^j_{k,t};\ V_t = \mathrm{diag}\left(\sigma^2_{d,i}; i \in I_k\right)$$

$$W_t = \left(\sigma^j_{f,k}\right)^2$$

$$m_0 = 0;\ C_0 = 1;$$

This algorithm is given by the following steps:

a) Forward filtering
For t = 1, …, T apply the following recursive expressions (Kalman filter)

$$a_t = m_{t-1},\ R_t = C_{t-1} + W_t$$

$$f_t = F_t a_t,\ Q_t = F_t R_t F_t' + V_t,\ A_t = R_t F_t' Q_t^{-1}$$

$$m_t = a_t + A_t(y_t - f_t),\ C_t = R_t - A_t Q_t A_t'$$

b) Backward sampling
For t = T,…, 1 draw θt from $N(m_T(k), C_T(k))$ with k = T-t and

$$m_T(0) = m_T,\ C_T(0) = C_T,\ B_t = C_t R_{t+1}^{-1}$$

$$m_T(k) = m_t + B_t(\theta_{t+1} - a_{t+1})$$

$$C_T(k) = C_t - B_t C_t$$

5. τ^j_k | rest of parameters, Data = $\tau^j_{k,t} \mid \left(f^j_{k,t}; t = 1,\ldots,T\right) \sim$

$$\mathrm{Gamma}\left(\frac{n_f + T - 1}{2}, \frac{n_f s_f^2 + \sum_{t=2}^{T}\left(f^j_{k,t} - f^j_{k,t-1}\right)^2}{2}\right)$$

A.4. Algorithm

This algorithm implements the Gibbs sampling used to draw a sample from the posterior distribution (A.5).

- Step 0 (Initiation)
  Draw a sample $\theta^{(0)} = (\alpha^{(0)'}, \beta^{(0)'}, \tau^{(0)}_{d}{}', f(0)', \tau^{(0)}_{f}{}')'$ from the prior distribution (A.1)-(A.4) and (3.2). Set the maximum number of iterations $n_{itermax}$.

- Step 1 (Gibbs sampling)
  For s = 1 to $n_{itermax}$ repeat the steps 1.1 to 1.4

- Step 1.1

For $i \notin C$ draw $\alpha^{(s)}_{i}$ from $\alpha_{i} \mid \tau^{(s-1)}_{d,i}$, $(f^{j,(s-1)}_{k,t}; t \in T_{i,j}, j \in J_{i})$, $(d^{j}_{k,t}; t \in T_{i,j}, j \in J_{i})$, given in A.3 1)

- Step 1.2

For $i \in C$ draw $(\alpha^{(s)}_{i}, \beta^{(s)}_{i})$ from $(\alpha_{i},\beta_{i})' \mid \tau^{(s-1)}_{d,i}$, $(f^{j,(s-1)}_{k,t}; t \in T_{i,j}, j \in J_{i})$, $(d^{j}_{k,t}; t \in T_{i,j}, j \in J_{i})$ given in A.3 2)

- Step 1.3

For i=1,…, p draw $\tau^{(s)}_{d,i}$ from $\tau_{d,i} \mid \alpha^{(s)}_{i}, \beta^{(s)}_{\cdot i}$, $(f^{j,(s-1)}_{k,t}; t \in T_{i,j}, j \in J_{i})$, $(d^{j}_{k,t}; t \in T_{i,j}, j \in J_{i})$, given in A.3. 3)

- Step 1.4.

For k=1,…, K; $j \in JF_{k}$; t=1,…,T draw $(f^{j,(s)}_{k,t}; t = 1,...,T)$ from $(f^{j,(s)}_{k,t}; t = 1,...,T)$
. $\alpha^{(s)}_{f,k}, \beta^{(s)}_{f,k}, \tau^{(s)}_{d,i}, \tau^{j,(s-1)}_{f,k}, d^{j}_{t}$, applying the forward-filtering and backward sampling algorithm described in A.3. 4) where $\alpha^{(s)}_{f,k}=(\alpha^{(s)}_{i}; i \in I_{\kappa})$; and $\beta^{(s)}_{f,k}=(\beta^{(s)}_{i}; i \in I_{\kappa})$

- Step 1.5

For k=1,…,K; $j \in JF_{k}$ draw $\tau^{j,(s)}_{f,k}$ from $\tau^{j}_{f,k} \mid (f_{k,t}^{j,(s)}; t = 1,...,T)$
As a result of the algorithm we obtain a sample of (A.4) given by

$$\{\theta^{(s)} = \alpha^{(s)'}, \beta^{(s)'}, \tau^{(s)'}, f^{(s)'}, \tau^{(s)'})'; s = s_{0}, s_{0+\ell}, s_{0+2\ell}, \ldots, s_{0}+(M-1)\ell=n_{itermax}\} \qquad (A.6)$$

where s_0 is chosen such that the Markov Chain associated to the Gibbs sampling converges to its stationary distribution (A.5) and ℓ is chosen such that the elements of (A.6) are approximately uncorrelated (see Robert and Casella, 2004 for details). In our case we take $n_{itermax}$ = 100000 iterations, s_0 = 10001 and ℓ=10. All the computations were made using MATLAB 6.5.

Using the information provided by (A.6) we can calculate point estimations of the parameters of the model (3.1)-(3.2) using the median and 95% Bayesian credibility intervals using the 2.5 and 97.5 quantiles of the corresponding components of θ. Furthermore smoothed trend of the dynamic evolution of the ratios can be estimated using $E[d_{i,t}^{j}|\text{Data}]$. This posterior expectation can be calculated from (A.6) using the Blacwell-Rao estimator (Casella and Robert, 1996) given by

$$\frac{1}{M}\sum_{m=1}^{M} E\left[d_{i,t}^{j} \mid \text{Data}, \theta^{(s_0+\ell(m-1))}\right] = \frac{1}{M}\sum_{m=1}^{M}\left(\alpha_i^{(s_0+\ell(m-1))} + \beta_i^{(s_0+\ell(m-1))} f_{k,t}^{j,(s_0+\ell(m-1))}\right) \tag{A.7}$$

95% Bayesian credibility intervals for the smoothed trend can be calculated from the 2.5 and 97.5 cuantiles of the sample

$$\left\{\alpha_i^{(s_0+\ell(m-1))} + \beta_i^{(s_0+\ell(m-1))} f_{k,t}^{j,(s_0+\ell(m-1))}; m = 1,\ldots,M\right\}$$

Finally 95% Bayesian forecasting intervals one-step ahead can be calculated for $\{d^{j}_{i,t};\ t=t_{min,i},\ldots,t_{max,i};\ j \in J_i;\ i = 1,\ldots,N\}$ using the composition sampling. To that end you must draw $d^{j,(m)}_{i,t}$ from $N((\alpha_i^{(s0+\ell(m-1))} + \beta_i^{(s0+\ell(m-1))} f_{k,t}^{j,(s0+\ell(m-1))}), (\tau_{d,i}^{(s0+\ell(m-1))})^{-2}$ for m=1,…,M.

The limits of these intervals are given by the 2.5 and 97.5 quantiles of the sample $\{d_{i,t}^{j,(m)};$ $m=1,\ldots,M\}$

REFERENCES

Aggarwal, R. (1981). “International Differences in Capital Structure Norms: An Empirical Study of Large European Companies”. *Management International Review*, 1, pp.75-88.

Carter, C.K. and Kohn, R. (1994). “On Gibbs sampling for state space models”. *Biometrika,* 81, 541-553.

Casella, G. and Robert, G. (1996). “Rao-Blacwellisation of Sampling Schemes”. *Biometrika,* 83**,** 81-94.

Deliktas, E. and Balcilar, M. (2005). “A Comparative Analysis of Productivity Growth, Catch-Up, and Convergence in Transition Economies”. *Emerging Markets Finance and Trade*, vol. 41, nº1, January-February, pp. 6-28.

Eickmeier, S. and Breitung, J. (2006). “How synchronized are new EU member states with the euro area? Evidence from a structural factor model”. *Journal of Comparative Economics,* 34, 3, pp. 538-563.

European Commission (1995). Financial Situation of European Enterprises. *European Economy*, supl. A, Economic trends, nº 2- Feb.

___ (1997). Financial Situation of European Enterprises. *European Economy*, supl. A, nº 7. Economic trends, nº 7- July.

___ (1998). Financial Situation of European Enterprises. European *Economy*, supl. A, Economic trends, nº 11/12- Feb.

___ (2001). “Financial Situation of European Enterprises”. *European Economy*, suppl A, nº 8/9, August/September, pp. 1-29.

___ (2004). “Convergence Report 2004”. *European Economy*, SEC (2004) 1268.

___ (2005a). “Second report on the implementation of the 2003-05 broad economic policy guidelines”. *European Economy*, nº1-05.

___ (2005b). “Special report Labour Market and Wage Development in 2004”. *European Economy*, nº3-05.

Früchwirth-Schnatter, S. (1994). “Data Augmentation and Dynamic Linear Models”. *Journal of Time Series Analysis*, 15, 183-202.

Gallizo, J.L.; Saladrigues, R. and Salvador, M. (2008). “Los nuevos países miembros de la UE. Análisis Contable de las divergencias y similitudes de las variables financieras de las empresas”. *Revista Española de Financiación y Contabilidad-Spanish Journal of Finance and Accounting, 139.*

Gallizo, J.L. and Salvador, M. (2002). “What factors drive and which act as a brake on the convergence of financial statements in EMU member countries? *Review of Accounting & Finance,* Vol. 1, 4. pp. 49-68.

Grosfeld, I. and Roland, G. (1997). “Defensive and Strategic Restructuring in Central European Enterprises”. *Journal of Transforming Economies and Societies*, 3 (4), pp. 21-46.

Hall, G.C.; Hutchinson, P.J. and Michaelas, N. (2004). “Determinants of the Capital Structures of European SMEs”. *Journal of Business Finance & Accounting*, 31, 5&6, pp 711-728.

Kenen, P. (1969). “The optimun currency area: An eclectic view. In: Mundell and Swoboda, Editors, *Monetary Problems of the International Economy*, Univ. of Chicago (1969).

Kocenda, E. and Svejnar, J (2003). “Ownership anf Firm Performance after Large-Scale Privatization. LICOS: Centre for Transitios Economics. *Working Paper Willian Davidson Institute*.

Landesmann, M. and Stehrer, R. (2000). ”Industrial Specialisation, Catching-up and Labour Market Dynamics” *Metroeconomica*, vol. 51,1, pp. 67-101.

McKinnon, R. (1963). “Optimun currency areas”. *American Economic Review*, 53, 4, pp. 717- 725.

Mundell, R (1961). “A Theory of optimun currency areas”. American *Economic Review* 51, pp. 509-517.

Park, H, (1998). “The Effect of National Culture on the Capital Structure of Firms”. *International Journal of Management*, 15, pp. 204-211.

Prasad, D.; Bruton, G.D, and Merikas, A. (1996). “An Empirical Study of the Capital Structure of Industries in the European Community”. *Journal of International Financial Markets, Institutions and Money*. Vol. 6, pp. 125-140.

Rajan, R.G. and Zingales, L. (1995). “What Do We Know About Capital Structure? Some Evidence from International Data”. *The Journal of Financ,* Vol. 50, pp. 1421-1460.

Rivaud-Danset, D.; Dubocage, E. and Salais, R. (2001). “Comparison between the financial structure of SMES and that of large enterprises (LES) using the BACH database. Economic Paper. ECFIN. Number 155. July.

Rivaud-Danset, D.; Dubocage, E.; Oheix, V. and Paranque, B. (2005). “Do Corporate Financial Patterns in European Countries Converge and Testify for Disintermediation?.” *Working Paper Series*. Available at SSRN. http://ssrn.com/abstract=838225.

Robert, C. and Casella, G. (2004). *Monte Carlo Statistical Methods (2nd. ed.)*. New York: Springer.

Serrano, C.; Mar-Molinero, C. and Gallizo, J. (2002). ‘A Multivariate Study of the EU Economy via Financial Statements Analysis’. *Journal of the Royal Statistical Society The Statistician* 51, Part 3, pp.335-354. Blackwell Publishers.

___ (2005). ‘Country and Size in Financial Ratios: A European Perspective. *Global Finance Journal*. Vol.16.

Sohinger, J. (2005). “Growth and Convergence in European Transition Economies”. *Eastern European Economics*, vol. 43, nº 2, March-April, pp. 73-94.

Szanyi, M. (2001). “Privatization and Greenfield FDI in the Economic Restructuring of Hungary”. *Transnational Corporations*, nº3, pp. 25-37.

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